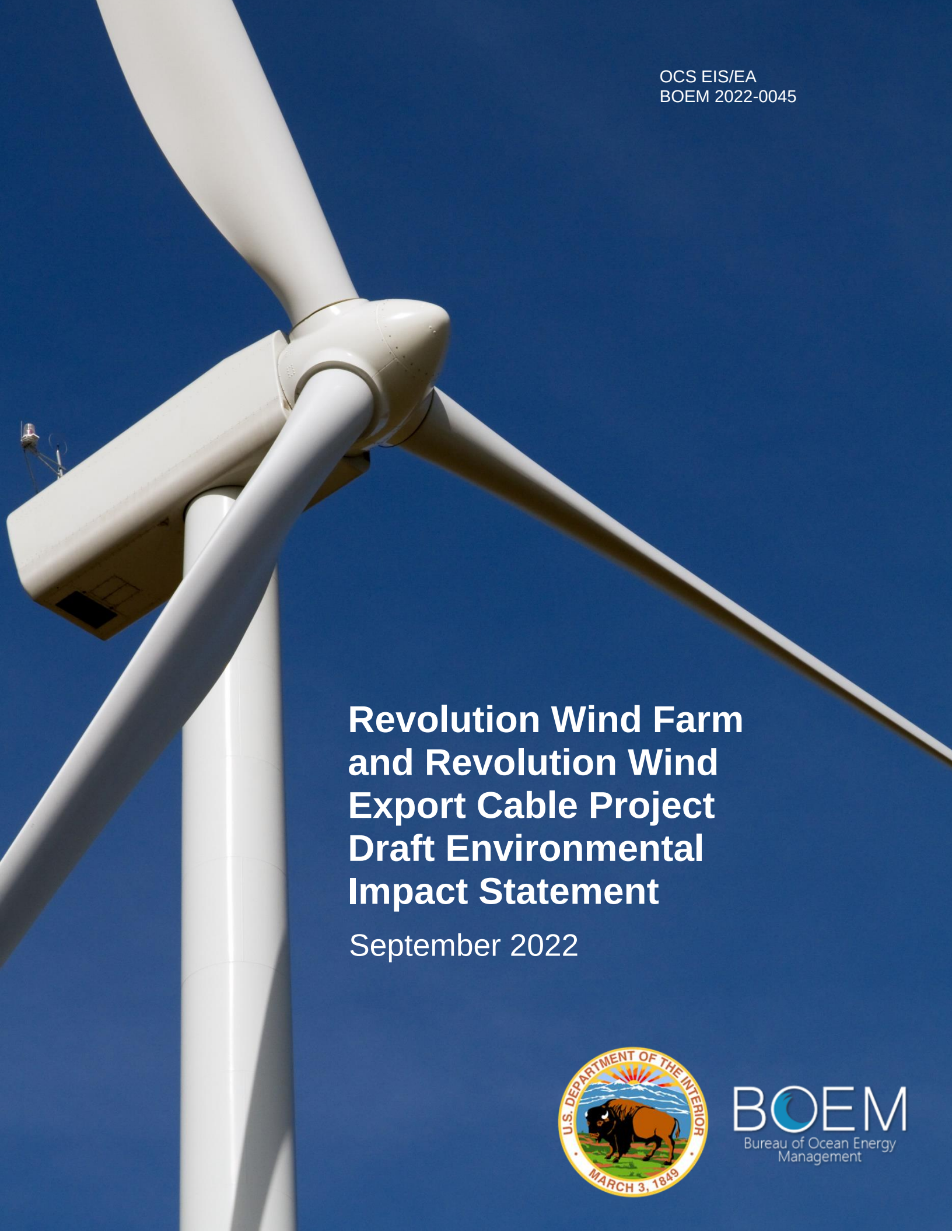

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September 2022

BOEM
Bureau of Ocean Energy Management

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Author:

Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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

Draft (X) Final ( )

Lead Agency:	U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM)
Cooperating Federal Agencies:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service U.S. Army Corps of Engineers U.S. Coast Guard U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement U.S. Environmental Protection Agency
Participating Federal Agencies:	Advisory Council on Historic Preservation National Park Service U.S. Department of Defense U.S. Department of Navy U.S. Fish and Wildlife Service
Cooperating State and Local Agencies:	Massachusetts Office of Coastal Zone Management Rhode Island Coastal Resources Management Council Rhode Island Department of Environmental Management
Contact Person:	Trevis Olivier National Environmental Policy Act Coordinator Office of Environment, Gulf of Mexico Regional Office Bureau of Ocean Energy Management 1201 Elmwood Boulevard New Orleans, Louisiana 70360 (504) 736-5713
Area:	Lease Area OCS-A 0486

Abstract:

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

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

EXECUTIVE SUMMARY

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

Cooperating agencies may rely on this EIS to support their decision-making. Revolution Wind has applied to the National Marine Fisheries Service (NMFS) for an incidental take authorization in the form of a Letter of Authorization for Incidental Take Regulations under the Marine Mammal Protection Act (MMPA), for take of marine mammals incidental to specified activities associated with the Project. NMFS needs to render a decision regarding the request for authorization due to NMFS' responsibilities under the MMPA (16 United States Code 1371(a)(5)(A and D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements. The U.S. Army Corps of Engineers intends to adopt BOEM's EIS to support its decision on any permits requested under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act.

Purpose of and Need for the Proposed Action

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

Revolution Wind's goal is to develop a commercial-scale offshore wind energy facility in the Lease Area with WTGs; a network of IACs; up to two offshore substations (OSSs) (OSS1 and OSS2); up to two export cables making landfall in North Kingstown, Rhode Island; one onshore substation; and one interconnection facility. The Project, as described here, is the Proposed Action considered by BOEM in this EIS. The need for the Project is to contribute to Connecticut's mandate of 2,000 megawatts (MW) of offshore wind energy by 2030, as outlined in Connecticut Public Act 19-71, and Rhode Island's 100% renewable energy goal by 2030, as outlined in Rhode Island Governor's Executive Order 20-01 of

January 2020. The Project would have the capacity to deliver up to 880 MW of power to the New England energy grid, satisfying the current power purchase agreement (PPA) total of 704 MW. Specifically, Revolution Wind's goal to construct and operate a commercial-scale offshore wind energy facility in the Lease Area is intended to fulfill the following three PPAs:

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

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

Public Involvement

Before the preparation of the EIS, BOEM conducted a 30-day public scoping period between April 30 and June 1, 2021, with an additional 7-day extension between June 4 and 11, 2021, following the correction of the notice of intent. During the public scoping period, BOEM held three public scoping virtual meetings via the Zoom webinar platform to solicit feedback and identify issues and potential alternatives for consideration. BOEM considered all scoping comments while preparing the EIS; the topics most referenced in the comments include impacts to birds and marine mammals. Additional public input occurred during the Project's planning and leasing phases between 2010 and 2018. Publication of the draft EIS will initiate a 45-day comment period open to all, after which BOEM will assess and consider all the comments received in preparation of the final EIS. See Appendix A for additional information on public involvement.

Alternatives

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

Table ES-1. Alternative Descriptions

Alternative	Description
A: No Action Alternative	The COP would not be approved, and the proposed construction and installation, O&M, and eventual decommissioning activities would not occur.
B: Proposed Action Alternative (Proposed Action)	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. The Proposed Action includes up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) up to 880 MW, the maximum capacity identified in the PDE. The WTGs would be connected by a network of IACs; up to two offshore substations (OSSs)[1] connected by an offshore substation-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore; and an onshore substation inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, Rhode Island. The Proposed Action includes the burial of offshore export cables below the seabed in both the OCS and Rhode Island state waters and a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs.
C: Habitat Impact Minimization Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be omitted while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than proposed by the lessee would be approved by BOEM. Under this alternative, BOEM could select one of the following alternatives: • Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east–west/north–south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 65 WTGs would be approved. • Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 64 WTGs would be approved. Refer to Appendix K for background information on the development of the Alternative C1 and C2 layouts.
D: No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the

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

Alternative	Description
	Buzzard's Bay Traffic Separation Scheme Inbound Lane would be eliminated while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs. Under this alternative, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). • Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Selecting this alternative would remove up to seven WTG positions and associated IACs from consideration. • Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Selecting this alternative would remove up to eight WTG positions and associated IACs from consideration. • Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Selecting this alternative would remove up to seven WTG positions and associated IACs. The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to a total of 22 WTG locations and associated IACs while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12 MW WTGs are used).
E: Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in Rhode Island, some WTG positions would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. • Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 64 WTG positions would be approved. • Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 81 WTG positions would be approved. Refer to Appendix K for background information on the development of the Alternative E1 and E2 layouts.
F: Selection of a Higher Capacity Wind Turbine Generator	The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under this

Alternative	Description
	alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five "spare" WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks.

Environmental Impacts

The EIS uses four levels of classification to characterize the potential adverse or beneficial impacts as negligible, minor, moderate, or major. Chapter 2, Section 2.3 provides a summary and comparison of incremental and overall cumulative impacts by alternative, which is provided below as Table ES-2. Impacts include both Project-specific impacts and incremental impacts of the Project when combined with other current and reasonably foreseeable projects (i.e., cumulative impacts). Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse. Green cell color represents negligible to minor adverse overall impact. Yellow cell color represents moderate adverse overall impact. Orange cell color represents major adverse overall impact. Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by hatched cells and an asterisk. Impacts associated with the other action alternatives are generally similar to those described for the Proposed Action. See Section 3.3 for additional information on impact levels, and Sections 3.4 through 3.22 for detailed descriptions of the impacts for each resource under each alternative. Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations 1502.16) require that an EIS evaluate the potential for unavoidable adverse impacts associated with a proposed action. The same regulations also require that an EIS review the potential impacts on irreversible or irretrievable commitments of resources resulting from implementation of a proposed action. Appendix I of the EIS provides these disclosures. BOEM has not identified a preferred alternative at this stage.

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

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Air quality*	Continuation of current air quality trends and sources of air pollution. The overall cumulative impact to air quality would be **minor** to **moderate** adverse and **minor** to **moderate** beneficial.*	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.
Bats	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. he overall cumulative impact to bats would be **negligible** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.
Benthic habitat and invertebrates*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to benthic habitat and invertebrates would be **minor** to **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*
Birds	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.
Coastal habitats and fauna	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to coastal habitats and fauna would be **negligible** to **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.
Commercial fisheries and for-hire recreational fishing*	Continuation of current trends. The overall cumulative impact would be **moderate** to **major** adverse for commercial fisheries and **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing.*	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Cultural resources	Continuation of individual IPF impacts to cultural resources from past and current activities. The overall cumulative impact to cultural resources would be **negligible** to **major** negative†.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.
Demographics, employment, and economics*	Continuation of current trends. The overall cumulative impact to demographics, employment, and economics would be **moderate** to **major** adverse and **minor** to **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*
Environmental justice*	Continuation of current trends. The overall cumulative impact to environmental justice communities would be **major** adverse and **negligible** to **moderate** beneficial.*	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.
Finfish and essential fish habitat*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*
Land use and coastal infrastructure*	Continuation of current trends. The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.
Marine mammals*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to marine mammals would be **moderate** adverse and **minor** beneficial.*	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Navigation and vessel traffic	Continuation of current trends. The overall cumulative impact to navigation and vessel traffic would be **minor** to **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.
Other uses: aviation and air traffic	Continuation of current trends. The overall cumulative impact to other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.
Other uses: land-based radar	Continuation of current trends. The overall cumulative impact to other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.
Other uses: military and national security	Continuation of current trends. The overall cumulative impact to other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.
Other uses: scientific research and surveys	Continuation of current trends. The overall cumulative impact to other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.
Other uses: undersea cables	Continuation of current trends. The overall cumulative impact to other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.

Resource	**Alternative A (No Action Alternative)**	**Alternative B (Proposed Action)**	**Alternative C (Habitat Alternative)**	**Alternative D (Transit Alternative)**	**Alternative E (Viewshed Alternative)**	**Alternative F (Higher Capacity Turbine Alternative)**
Recreation and tourism	Continuation of current trends. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.
Sea turtles*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to sea turtles would be **minor** adverse and **minor** beneficial.*	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.
Visual resources	Continuation of impacts to viewshed from past and current activities. The overall cumulative impact to visual resources would be **moderate** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.
Water quality	Continuation of current water quality trends and sources of pollution. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.
Wetlands and other waters of the United States	Continuation of current wetland resources trends and sources of pollution. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.

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Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
µm/s^2	micrometers per second squared
µPa	micropascal
µPa^2	micropascal squared
µPa/sec^2	micropascal per second squared
µV	microvolt
AC	alternating current
ADLS	aircraft detection lighting system
AGL	above ground level
AIS	Automatic Identification System
amsl	above mean sea level
ANSI	American National Standards Institute
APE	area of potential effects
AQRV	air quality related values
ASFMC	Atlantic States Marine Fisheries Commission
ASL	above sea level
ASR	airport surveillance radar
ATON	aid to navigation
AVERT	AVoided Emissions and geneRation Tool
BA	biological assessment
BACI	before-and-after-control-impact
BCC	Birds of Conservation Concern
BID	Block Island State Airport
BIWF	Block Island Wind Farm
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
bri	Biodiversity Research Institute
BSEE	Bureau of Safety and Environmental Enforcement
CAA	Clean Air Act
CBRA	Cable Burial Risk Assessment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	centimeter
CMECS	Coastal and Marine Ecological Classification System
CO	carbon monoxide
CO_2e	carbon dioxide equivalents
COBRA	CO-Benefits Risk Assessment
COP	construction and operations plan
CTV	crew transport vessel
CWA	Clean Water Act
cy	cubic yards
dB	decibels
dBA	A-weighted decibels
dB re 1 µPa	decibels referenced to a pressure of one micropascal
dB re 1 µPa^{2}s	decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second
dB_{RMS}	root mean square decibels
DEM	Department of Environmental Management
DFOS	distributed fiber-optic sensing
DMA	Dynamic Management Area
DO	dissolved oxygen
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DP	dynamic positioning
DPS	distinct population segment
EA	environmental assessment
EFH	essential fish habitat
EIS	environmental impact statement
EO	Executive Order
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency

EPM	environmental protection measure
ERM	Environmental Resource Map
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHWG	Fisheries Hydroacoustic Working Group
FMP	fishery management plan
FONSI	finding of no significant impact
FRMP	fisheries research and monitoring plan
FTE	full-time equivalent
GAA	geographic analysis area
G&G	geological and geophysical
GDP	gross domestic product
GHG	greenhouse gas
GW	gigawatt
HAPC	Habitat Area of Particular Concern
hazmat	hazardous materials
HDD	horizontal directional drilling
HF	high frequency
HFC	high-frequency cetaceans
HMS	highly migratory species
HRG	high-resolution geophysical
HRVEA	historic resources visual effects assessment
HVAC	high-voltage alternating current
HVDC	high-voltage direct current
Hz	hertz
IAC	inter-array cable
ICF	interconnection facility
IHA	Incidental Harassment Authorization
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPaC	Information for Planning and Consultation
IPF	impact-producing factor
ITA	Incidental Take Authorization
ITR	Incidental Take Regulation
JEDI-OWM	Jobs and Economic Development Impacts Offshore Wind Model
kHz	kilohertz
kJ	kilojoule
km	kilometer
km^2	square kilometers
KOP	key observation point
kV	kilovolt
LCA	Landscape Character Area
Lease	Commercial Lease OCS-A 0486
Lease Area	Lease Number OCS-A 0486
Leq	equivalent sound level
LOA	Letter of Authorization
Lpk	zero-to-peak sound pressure level
Lrms	root-mean-square sound pressure level (also SPL)
LFC	low-frequency cetaceans
m	meter
m^3	cubic meter
MAFMC	Mid-Atlantic Fishery Management Council
MARA	marine archaeological resources assessment
MARCO	Mid-Atlantic Regional Council on the Ocean
MARIPAS	Massachusetts and Rhode Island Port Access Study
MARPOL	International Convention for the Prevention of Pollution from Ships
MA WEA	Massachusetts Wind Energy Area
MBTA	Migratory Bird Treaty Act
MDAT	Marine-life Data and Analysis Team
MEC	munitions and explosives of concern
met	meteorological
MFC	mid-frequency cetaceans
mG	milligauss

mg/L	milligrams per liter
MHC	Massachusetts Historical Commission
mm	millimeter
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MOA	memorandum of agreement
MOU	memorandum of understanding
m/s	meters/second
MVAs	minimum vectoring altitudes
MVCO	Martha's Vineyard Coastal Observatory
mV/m	millivolt/meter
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NARW	North Atlantic right whale
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NH_3	ammonia
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NREL	National Renewable Energy Laboratory
NSRA	navigational safety risk assessment
NWR	National Wildlife Refuge
NYMRC	New York Marine Rescue Center
O&M	operations and maintenance
O_3	ozone
OBIS-SEAMAP	Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations
OCA	Ocean Character Area
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OMB	Office of Management and Budget
OnSS	onshore substation
OSAMP	Ocean Special Area Management Plan
OSRP	oil spill response plan
OSS	offshore substation
OSS-link cable	offshore substation-link cable
OSW	offshore wind
OTR	Ozone Transport Region
PAL	Public Archaeology Laboratory, Inc.
PAM	passive acoustic monitoring
PATON	private aids to navigation
PCBs	polychlorinated biphenyls
PDE	project design envelope
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
PPA	power purchase agreements
ppb	parts per billion
Project	Revolution Wind Farm and Revolution Wind Export Cable Project
PSO	Protected Species Observer
psu	practical salinity unit
PTS	permanent threshold shift
PVD	Providence

RAM	Radar Adverse-impact Management
Revolution Wind	Revolution Wind, LLC
RFA	Regional Fisheries Area
RICR	Rhode Island Code of Regulations
RI CRMC	Rhode Island Coastal Resources Management Council
RIHPHC	Rhode Island Historic Preservation and Heritage Commission
RI/MA WEA	Rhode Island/Massachusetts Wind Energy Area
RINHP	Rhode Island Natural Heritage Program
RIPDES	Rhode Island Pollutant Discharge Elimination System
RIWAP	Rhode Island Wildlife Action Plan
RLOS	Radar Line of Sight Study
rms	root mean square
ROD	record of decision
RODA	Responsible Offshore Development Alliance
ROW	right-of-way
RSZ	rotor swept zone
RWEC	Revolution Wind Export Cable
RWEC-OCS	RWEC offshore segment in federal waters
RWEC-RI	RWEC offshore segment in state waters
RWF	Revolution Wind Farm
SAP	site assessment plan
SAR	search and rescue
SAV	submerged aquatic vegetation
SCA	Seascape Character Area
SCADA	supervisory control and data acquisition
Secretary	Secretary of the Interior
SEFSC	Southeast Fisheries Science Center
SEL	sound exposure level
SFEC	South Fork Export Cable
SFWF	South Fork Wind Farm
SIP	state implementation plan
SLIA	seascape and landscape impacts assessment
SLVIA	seascape, landscape, and visual impacts assessment
SMA	Seasonal Management Area
SO_2	sulfur dioxide
SOV	service operations vessel
SPCC	spill prevention, control, and countermeasures
SPL	root-mean-square sound pressure level (also Lrms)
STSSN	Sea Turtle Stranding and Salvage Network
TARA	terrestrial archaeological resources assessment
TCP	traditional cultural properties
THPO	tribal historic preservation office
TJB	transition joint bay
TNEC	The Narragansett Electric Company d/b/a National Grid
tpy	tons per year
TRACON	Terminal Radar Approach Control
TSS	total suspended solid
TTS	temporary threshold shift
UDP	Unanticipated Discovery Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
VFR	Visual Flight Rules
vhb	Vanasse Hangen Brustlin, Inc.
VIA	visual impact assessment
VMS	vessel monitoring system
VOC	volatile organic compound

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

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1 Introduction

This environmental impact statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and decommissioning of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project), as proposed by Revolution Wind, LLC (Revolution Wind) (formerly DWW Rev I, LLC) in its construction and operations plan (COP) (vhb 2022). The Project would be located in the Bureau of Ocean Energy Management's (BOEM) Renewable Energy Lease Number OCS-A 0486 (Lease Area) approximately 15 nautical miles (nm) (18 statute miles[1]) southeast of Point Judith, Rhode Island; approximately 13 nm (15 miles) east of Block Island, Rhode Island; approximately 7.5 nm (8.5 miles) south of Nomans Land Island National Wildlife Refuge (NWR) (uninhabited island); and between approximately 10.0 and 12.5 nm (12 and 14 miles) south-southwest of varying points of the Rhode Island and Massachusetts coastlines 15.0 miles east of Block Island, Rhode Island (Figure 1.1-1).

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

This EIS was prepared following the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.) and implementing regulations (40 Code of Federal Regulations [CFR] 1500–1508). The Council on Environmental Quality's (CEQ's) current regulations contain a presumptive time limit of 2 years for completing EISs as well as a presumptive page limit of 150 pages or fewer or 300 pages for proposals of unusual scope or complexity. BOEM has followed those limits in preparing this EIS in accordance with the current regulations. Additionally, this EIS was prepared consistent with the U.S. Department of the Interior's (DOI's) NEPA regulations (43 CFR 46), longstanding federal judicial and regulatory interpretations, and U.S. Administration priorities and policies including the Secretary of the Interior's (Secretary's) Order No. 3399 requiring bureaus and offices to not apply any of the provisions of the 2020 changes to CEQ regulations (the "2020 rule") (CEQ 2020) in a manner that would change the application or level of NEPA that would have been applied to a proposed action before the 2020 rule went into effect.

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

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

1.1 Background

The history of BOEM's planning and leasing activities offshore Rhode Island is summarized in Table 1.1-1. On March 13, 2020, Revolution Wind (formerly DWW Rev I, LLC) submitted an initial Project COP to BOEM. After multiple BOEM reviews and revisions to address BOEM's comments, Revolution Wind submitted an updated COP on April 29, 2021, deemed sufficient to begin the NEPA process, which BOEM initiated on April 30, 2021, with issuance of the notice of intent (NOI) (BOEM 2021a). As described in Appendix A, the initial public scoping period occurred from April 30 through June 1, 2021. On June 4, 2021, BOEM issued a correction to the NOI with a reopening of the public scoping period through June 11, 2021 (BOEM 2021b).

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

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

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

Year	Milestone
2016	A site assessment plan (SAP) for Lease Area OCS-A 0486 was filed on April 1, 2016, with revisions filed in July, September, and November 2016. BOEM determined the SAP was complete on October 7, 2016.
2017	On October 12, 2017, BOEM approved the SAP for Lease Area OCS-A 0486.
2020	On January 10, 2020, a request was made to BOEM to segregate Lease Area OCS-A 0486 to accommodate both the RWF and RWEC Project and the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project. The RWF and RWEC Project retained lease number OCS-A 0486, whereas a new lease number was assigned for the SFWF and SFEC Project (OCS-A 0517). Revolution Wind submitted its initial COP to BOEM on March 13, 2020.
2021	Revolution Wind submitted its updated COP on April 29, 2021. On April 30, 2021, BOEM published in the *Federal Register* an NOI to prepare an EIS for Revolution Wind's proposed wind energy facility offshore Rhode Island (BOEM 2021a). On June 4, 2021, BOEM issued a correction to the NOI with a reopening of the public scoping period (BOEM 2021b). The correction addressed and clarified two statements in the NOI regarding the energy capacity of the proposed wind farm and its distance from shore. In addition, the NOI correction reopened the comment period, allowing for comments to be received by June 11, 2021. Updated versions of the COP were submitted on December 15, 2021, and on July 21, 2022.

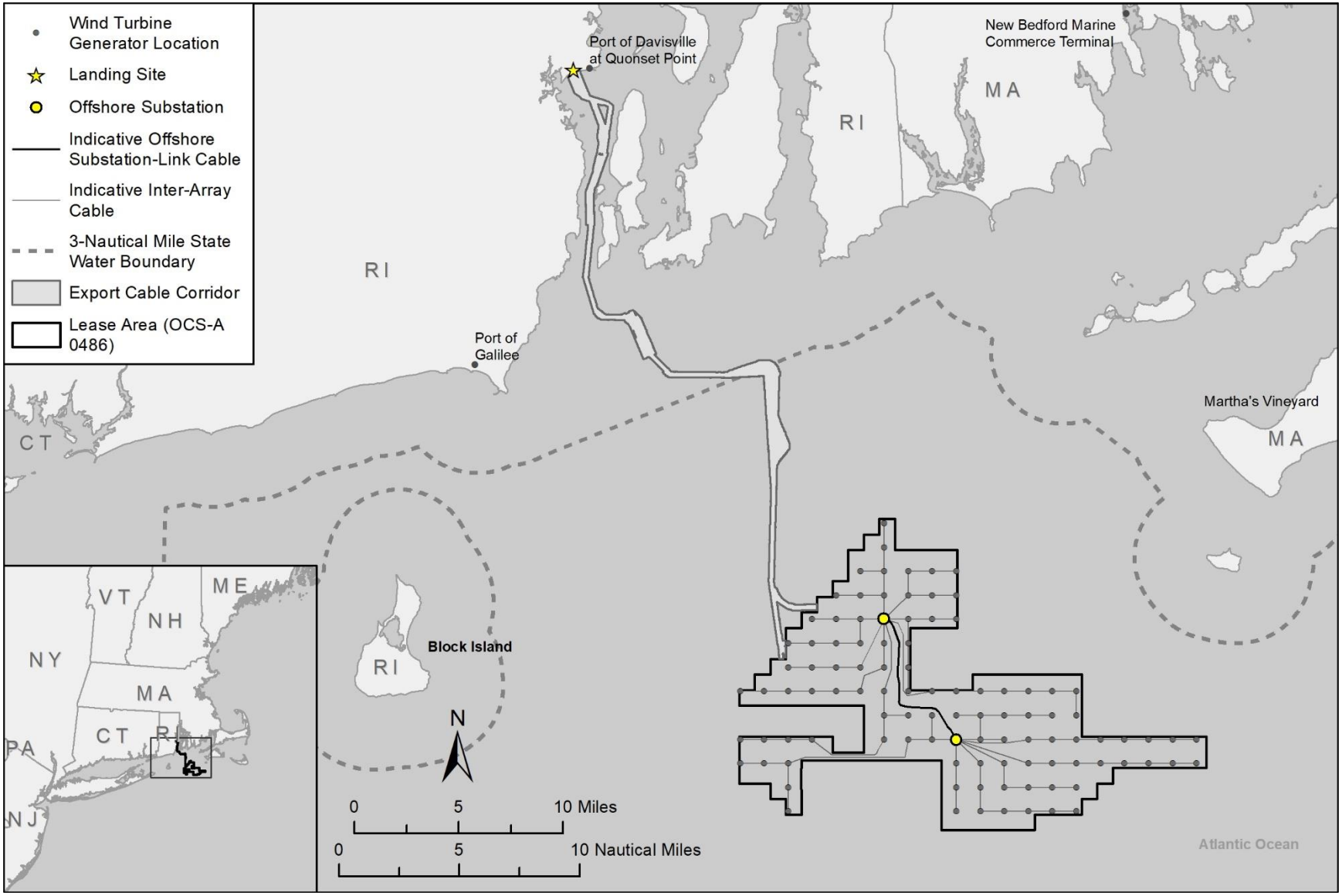


Figure 1.1-1. Project overview.

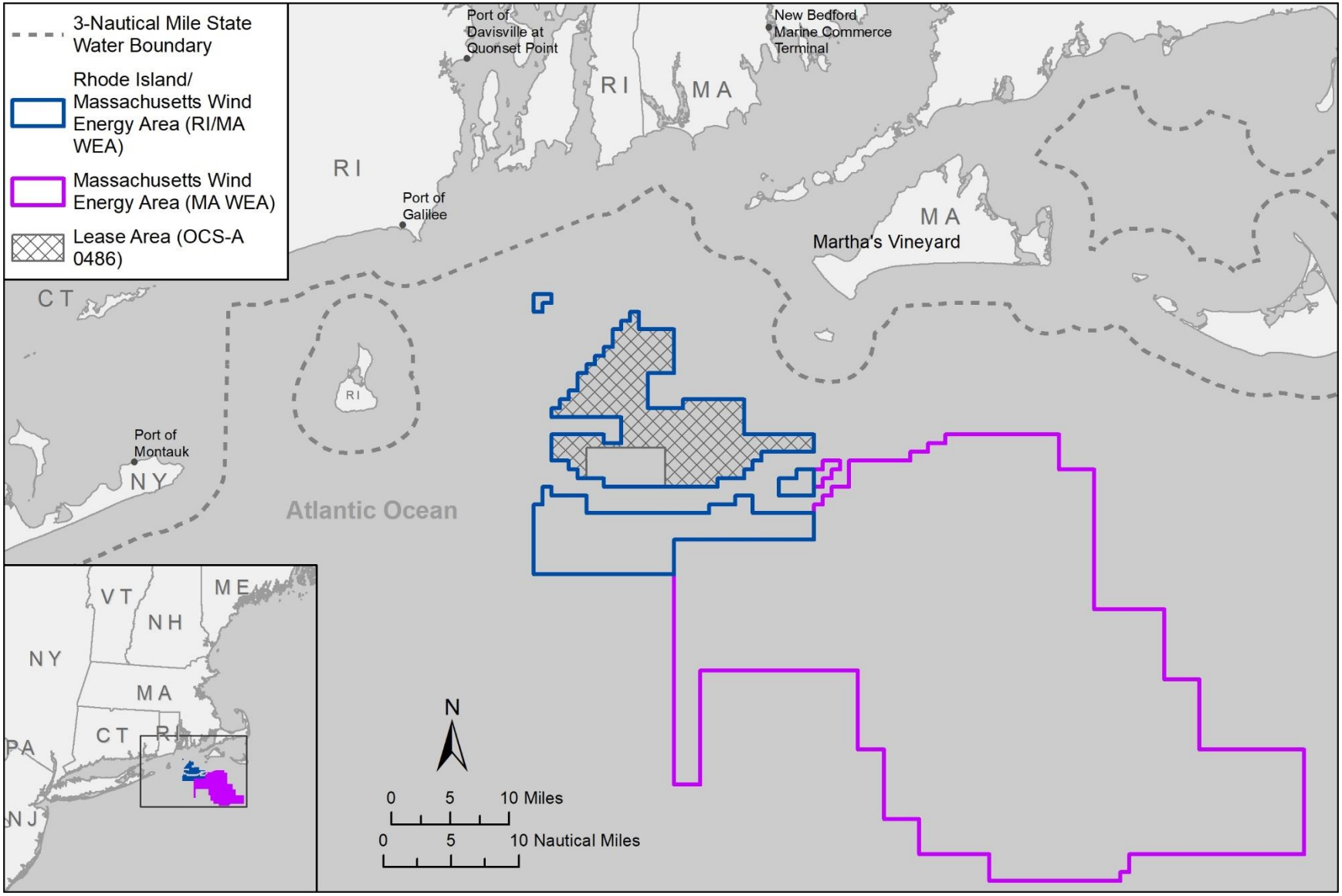


Figure 1.1-2. New England wind energy areas.

1.2 Purpose and Need for the Proposed Action

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

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

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

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

Based on BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, and Executive Order 14008; the shared goals of the federal agencies to deploy 30 GW of offshore wind energy capacity in the United States by 2030, while protecting biodiversity and promoting ocean co-use (The White House 2021); and in consideration of the goals of the applicant, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove Revolution Wind's COP. BOEM will make this determination after weighing the factors in subsection 8(p)(4) of the OCSLA that are applicable to plan decisions and in consideration of the above goals. In making this determination, the Secretary retains wide discretion to weigh those goals as an application of their technical expertise and policy judgment (DOI 2021). This determination is made at the record of decision (ROD) stage. If BOEM disapproves the Revolution Wind COP, per 30 CFR 585.628(f)(2), BOEM will inform Revolution Wind of the reasons and allow Revolution Wind an opportunity to resubmit a revised COP addressing the concerns identified. BOEM's

action is needed to fulfill its duties under the lease, which require BOEM to make a decision on the lessee's plans to construct and operate a commercial-scale offshore wind energy facility within the Lease Area (the Proposed Action).

The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) anticipates receipt of one or more requests for authorization to take marine mammals incidental to activities related to the Project pursuant to the Marine Mammal Protection Act (MMPA). NMFS's issuance of an MMPA incidental take authorization in the form of a Letter of Authorization (LOA) for Incidental Take Regulations (ITRs) is a major federal action and, in relation to BOEM's action, is considered a connected action (40 CFR 1501.9(e)(1)). The purpose of the NMFS action—which is a direct outcome of Revolution Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., specifically pile driving)—is to 1) evaluate the applicant's request pursuant to the specific requirements of the MMPA and its implementing regulations administered by NMFS (considering impacts of the applicant's activities on relevant resources), and if appropriate, 2) issue the permit or authorization. NMFS needs to render a decision regarding the request for authorization due to NMFS's responsibilities under the MMPA (16 USC 1371(a)(5)(A and D)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements.

The U.S. Army Corps of Engineers (USACE) New England District anticipates requests for authorization of a permit action to be undertaken through authority delegated to the District Engineer by 33 CFR 325.8, pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344). The USACE considers issuance of a permit under these two delegated authorities a major federal action connected to BOEM's Proposed Action (40 CFR 1501.9(e)(1)). The applicant's stated purpose and need for the Project, as indicated above, is to provide a commercially viable offshore wind energy project within Lease OCS-A 0486 to meet New England's need for clean energy. The USACE's basic Project purpose, as determined by the USACE for Section 404(b)(1) guidelines evaluation, is offshore wind energy generation. The USACE'S overall Project purpose for Section 404(b)(1) guidelines evaluation, as determined by the USACE, is the construction and operation of a commercial-scale offshore wind energy project, including associated transmission lines, for renewable energy generation and distribution to the Connecticut and Rhode Island energy grids. The USACE intends to adopt BOEM's EIS to support its decision on any permits requested under Section 10 of the Rivers and Harbors Act or Section 404 of the CWA.

1.3 Regulatory Framework

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

> ensure that any activity under this subsection [8(p)] is carried out in a manner that provides for . . . prevention of interference with reasonable uses (as determined by the Secretary) of the exclusive economic zone, the high seas, and the territorial seas . . . [and]

> consideration of . . . any other use of the sea or seabed, including use for a fishery, a sealane, a poential site of a deepwater port, or navigation. (Section 8(p)(4)(I) and (J)).

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

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

In addition, 30 CFR 585.621 provides that a

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

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

> no activities authorized [under it] will be carried out in a manner that: (a) could unreasonably interfere with or endanger activities or operations carried out under any lease or grant issued or maintained pursuant to the Act, or under any other license or approval from any Federal agency; (b) could cause any undue harm or damage to the environment; (c) could create hazardous or unsafe conditions; or (d) could adversely affect sites, structures, or objects of historical, cultural, or archaeological significance, without notice to and direction from the Lessor on how to proceed.

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

1.4 Relevant Existing NEPA and Consulting Documents

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

Table 1.4-1. National Environmental Protection Agency Documents Used to Inform the Evaluated Environmental Impact Statement Issues

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

Additional environmental studies conducted to support planning for offshore wind energy development are available on BOEM's website: https://www.boem.gov/renewable-energy-research-completed-studies.

1.5 Methodology for Assessing the Project Design Envelope

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

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

1.6 Methodology for Assessing Impacts from Planned Actions

Reasonably foreseeable impacts can occur from individually minor but collectively significant actions that take place over time. Therefore, this EIS also assesses planned actions that could occur during the life of the Project and potentially contribute to cumulative impacts when combined with impacts from the Proposed Action and other alternatives. Appendix E provides an analysis of the impacts of the types of actions (including the future action of approving wind farm development activities other than the Project) that BOEM has identified as potentially contributing to the impacts from the planned actions when combined with impacts from the Proposed Action and other alternatives over the geographic and time scale identified.

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

2 Alternatives Including the Proposed Action

2.1 Alternatives

Sections 2.1.1 through 2.1.6 of this chapter describe five action alternatives and a no action alternative for the Project, which are summarized in Table 2.1-1. Section 2.1.7 addresses alternatives not carried forward for analysis, Section 2.2 addresses non-routine activities and low-probability events associated with the Project, and Section 2.3 provides a summary and comparison of impacts by alternative. These alternatives were developed using BOEM's screening criteria for determining a range of reasonable alternatives, extensive coordination with cooperating and participating agencies (federal, state, local, and tribal agencies), and input from the public and potentially affected stakeholders throughout the scoping process (BOEM 2022). The alternatives described below are not mutually exclusive. If the COP is approved or approved with modifications, BOEM could "mix and match" multiple listed alternatives or components thereof to result in a preferred alternative so long as crucial design parameters are compatible and otherwise meet the purpose of and need for the Proposed Action.

Table 2.1-1. Alternative Descriptions

Alternative	Description
A: No Action Alternative	The COP would not be approved, and the proposed construction and installation, O&M, and eventual decommissioning activities would not occur.
B: Proposed Action Alternative (Proposed Action)	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. The Proposed Action includes up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing PPAs (total of 704 MW) up to 880 MW, the maximum capacity identified in the PDE. The WTGs would be connected by a network of IACs; up to two offshore substations (OSSs)[3] connected by an offshore substation-link cable; up to two submarine export cables co-located within a single corridor; up to two underground transmission circuits located onshore; and an onshore substation inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, Rhode Island. The Proposed Action includes the burial of offshore export cables below the seabed in both the OCS and Rhode Island state waters and a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs.

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

Alternative	Description
C: Habitat Impact Minimization Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be omitted while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than proposed by the lessee would be approved by BOEM. Under this alternative, BOEM could select one of the following alternatives: • Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east–west/north–south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 65 WTGs would be approved. • Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 64 WTGs would be approved. Refer to Appendix K for background information on the development of the Alternative C1 and C2 layouts.
D: No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the Buzzard's Bay Traffic Separation Scheme Inbound Lane would be eliminated while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs. Under this alternative, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). • Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Selecting this alternative would remove up to seven WTG positions and associated IACs from consideration. • Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Selecting this alternative would remove up to eight WTG positions and associated IACs from consideration. • Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Selecting this alternative would remove up to seven WTG positions and associated IACs.

Alternative	Description
	The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to a total of 22 WTG locations and associated IACs while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12 MW WTGs are used).
E: Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in Rhode Island, some WTG positions would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. • Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 64 WTG positions would be approved. • Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 81 WTG positions would be approved. Refer to Appendix K for background information on the development of the Alternative E1 and E2 layouts.
F: Selection of a Higher Capacity Wind Turbine Generator	The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five "spare" WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks.

2.1.1 Alternative A: No Action Alternative

Under Alternative A, hereafter referred to as the No Action Alternative, BOEM would not approve the RWF COP, and the Project construction and installation, O&M, and decommissioning would not occur.[4] Likewise, no additional permits or authorizations would be required. Any potential environmental and socioeconomic impacts, including beneficial impacts, associated with the Project, as described under the Proposed Action, would not occur. However, all other existing or reasonably foreseeable impact-

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

producing activities would persist. Table 2.3-1 provides an impact assessment of the No Action Alternative for each resource, including an assessment for cumulative effects. The No Action Alternative cumulative effects assessment provides an assessment for impacts with and without approval of additional wind farms in BOEM lease areas. Through these assessments, the No Action Alternative provides a baseline against which all action alternatives are evaluated. The selection of the No Action Alternative would not foreclose the submittal of a revised or future COP in the lease area; however, any future COP submission would initiate a new NEPA analysis.

2.1.2 Alternative B: Proposed Action Alternative

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

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

2.1.2.1 Revolution Wind Farm Components

As presented in Table 2.1-2, the RWF components and their construction and operation footprints include up to 100 WTGs, up to two OSSs (OSS1 and OSS2), a network of IACs, and one OSS-link cable. The PDE allows for a range of WTGs between 8 and 12 MW in capacity.

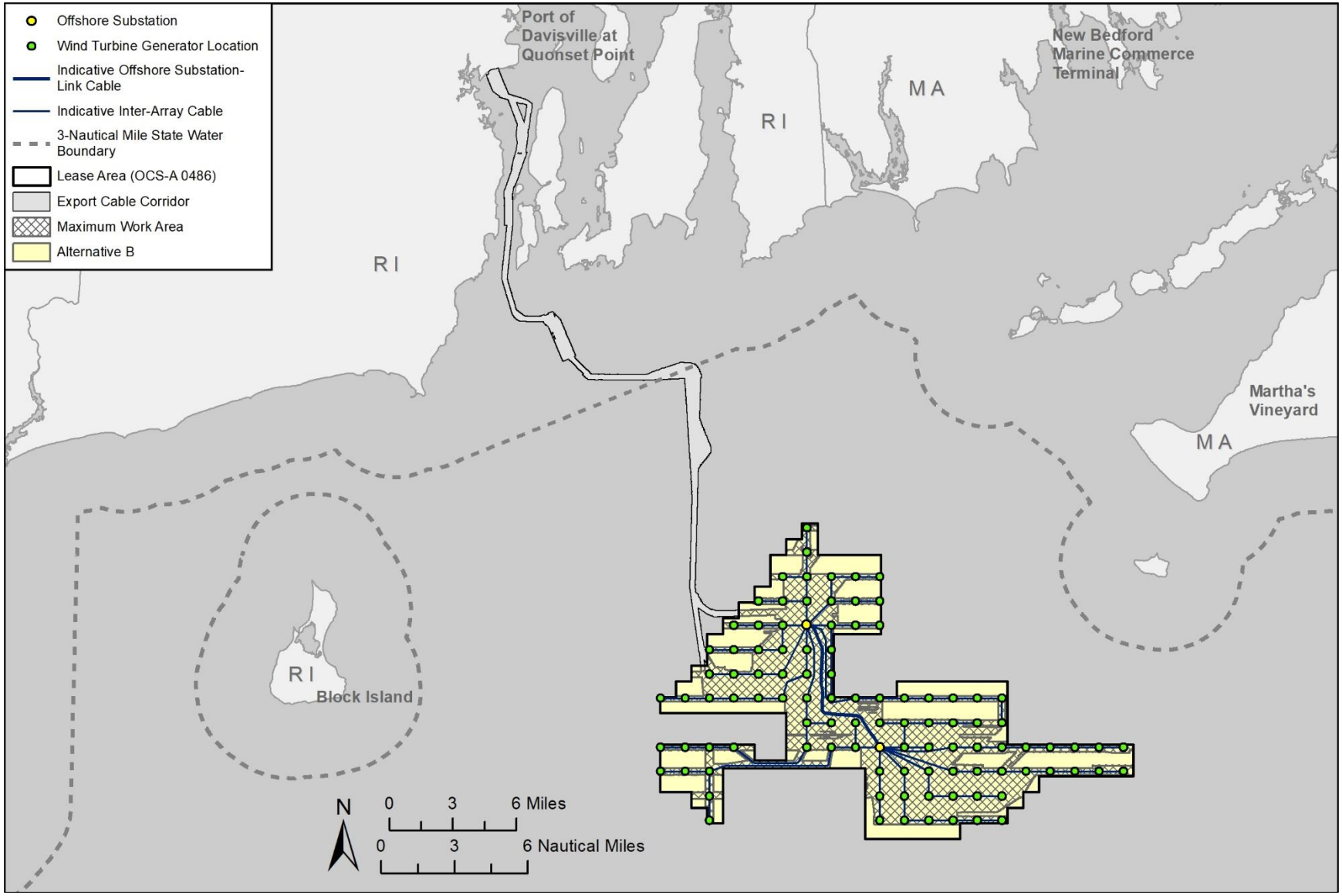


Figure 2.1-1. Offshore Project location and components under the Proposed Action (Alternative B).

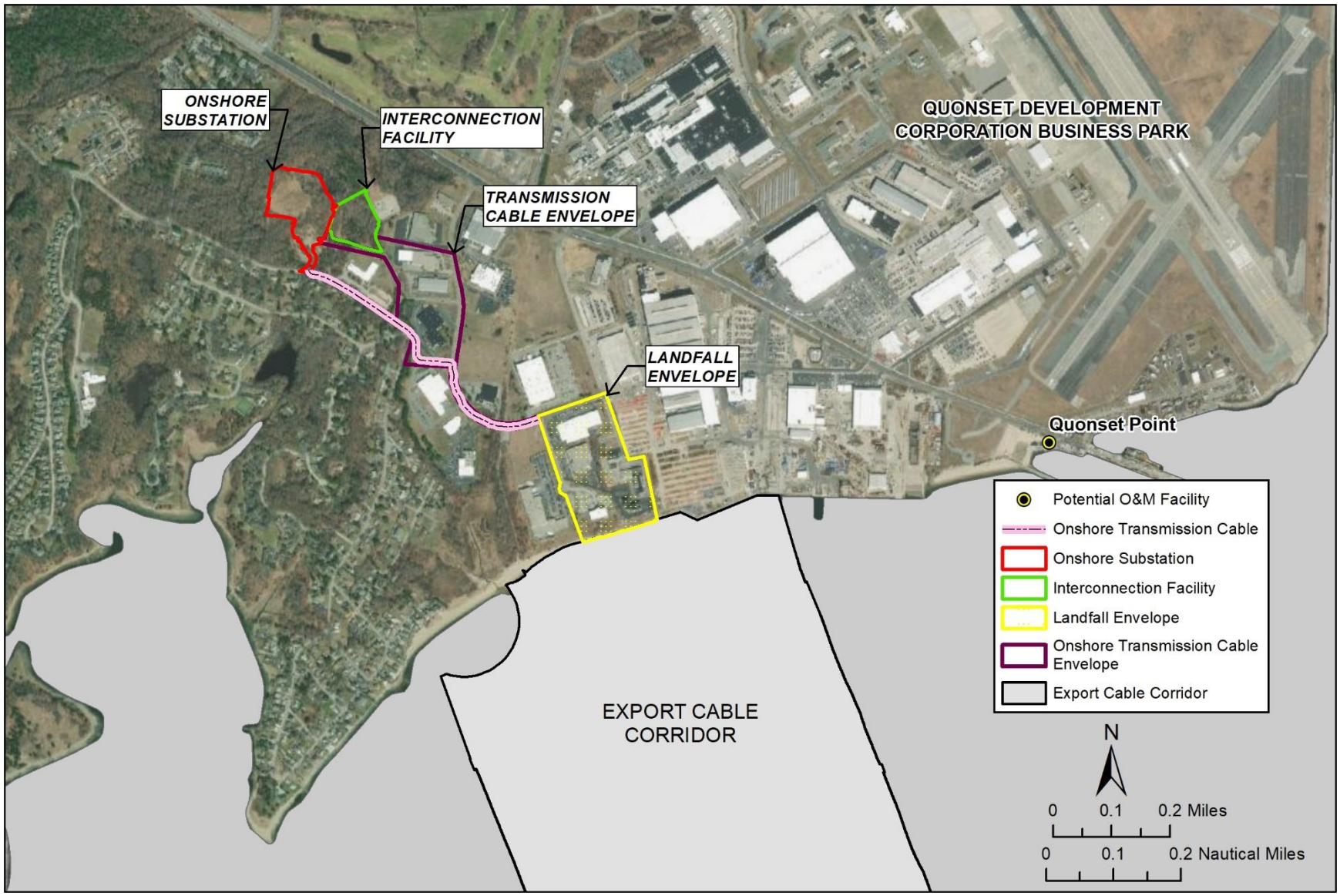


Figure 2.1-2. Onshore Project location and components under the Proposed Action (Alternative B).

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

Project Component	Location	Project Envelope Characteristics	Construction and Installation Footprint	Operation Footprint
WTGs WTG monopile foundation WTG monopile scour protection	Offshore in the OCS	WTGs: Up to 100 WTGs with a nameplate capacity of 8 to 12 MW, rotor diameter of 538 to 722 feet, hub height of 377 to 512 feet above mean sea level (amsl), and upper blade tip height up to 873 feet amsl WTG monopile foundation: A diameter of 20 to 39 feet and a target burial depth of 98 to 164 feet WTG monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation*	WTG monopile foundation: 7.2 acres x 100 WTG = 720 acres	WTG monopile foundation: 0.027 acres x 100 WTG = 2.7 acres WTG monopile scour protection: 0.7 acres x 100 WTG = 70 acres
OSS OSS monopile foundation OSS monopile scour protection	Offshore in the OCS	OSS: Up to two OSSs (OSS1 and OSS2) and up to 180 feet amsl (with lighting protection) OSS monopile foundation: A diameter of 20 to 49 feet and a maximum embedment depth of 164 feet OSS monopile scour protection: Rock placement, mattress protection, sandbags, and/or stone bags placed prior to foundation installation*	OSS monopile foundation: 7.2 acres x 2 OSS = 14.4 acres	OSS monopile foundation: 0.043 acres x 2 OSS = 0.086 acres OSS monopile scour protection: 0.7 acre x 2 OSS = 1.4 acres
IAC IAC protection	Offshore in the OCS	IAC: Up to a 155-mile total length with a 72-kilovolt (kV) alternating current (AC) cable with a diameter of 8 inches connecting WTGs and OSSs IAC protection: Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of the route for each cable	IAC: 2,471 acres	IAC protection: 74.1 acres‡‡
OSS-link cable†	Offshore in the OCS	Up to a 9-mile-long 275-kV high-voltage AC OSS-link cable with a diameter of 11.8 inches connecting OSS1 and OSS2	148 acres	N/A
OSS-link cable protection	Offshore in the OCS	Rock berms, concrete mattresses, fronded mattresses, and/or rock bags constituting up to 10% of route for each cable	N/A	4.4 acres

Project Component	Location	Project Envelope Characteristics	Construction and Installation Footprint	Operation Footprint
Vessel anchoring and mooring	Offshore in the OCS, state waters, along the RWEC offshore route, and at the cable landfall	Vessels for cable laying may anchor within the 1,640-foot-wide project easement. Anchors for cable laying vessels have a maximum penetration depth of 15 feet. Jack-up vessels for foundation and WTG installation include up to four spudcans with a maximum penetration depth of 52 feet and would occur within the 656-foot radius around foundation locations.	Not provided; per the COP, vessel anchoring and mooring may occur at any location in the APE.‡	N/A

Source: vhb (2021)

Note: COP Tables 1.2-1, 3.3.4-1, 3.3.4-2, 3.3.5-1 3.3.6-1, 3.3.6-2, 3.3.7-1, 3.3.7-2, 3.3.8-1, and 4.1.1 provide assumptions used to develop the footprint estimates.

* As described in COP Section 3.3.4.2, scour protection would be installed around foundations. Several types of scour protection may be considered, including rock placement, mattress protection, sandbags, and stone bags. However, rock placement is the most frequently used solution. The design typically includes a sloped outer edge that meets the natural grade of the seafloor to the extent practicable. Depending on the nature of the rock used, the size would vary, but the average diameter would be approximately 8 inches (20 centimeters [cm]). Additional details for the engineering specifications for the rock required for use as scour protection at the RWF are provided here. Any rock used for scour protection would meet these specifications. As reported in the COP (see Table 1-2.1, for example), the maximum area of scour protection per foundation would be up to 0.7 acre for monopiles. Appendix H, Supplemental Project Information, also includes a conceptual drawing for cable/scour protection at foundations. Engineering specifications for rock are as follows:

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

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

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

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

2.1.2.1.1 Wind Turbine Generators

Each WTG would comprise the following major components: a tower, a nacelle (a cover housing the generator, gear box, drive train, and brake assembly), and a rotor that includes three blades. Figure 2.1-3 and Table 2.1-3 provide typical dimensions for different WTG size classes that fall within the PDE. Control, lighting, marking, and safety systems would be installed on each WTG.[5] If needed, the WTGs could be powered by a permanent battery backup power solution with integrated energy harvest from the rotor or by a temporary diesel generator. The WTGs could be accessed from either a vessel via a boat landing or alternative means of safe access (e.g., Get Up Safe, a motion-compensated hoist system allowing vessel-to-foundation personnel transfers without a boat landing), ladders, a crane, and other ancillary components (COP Section 3.3.4.1).

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

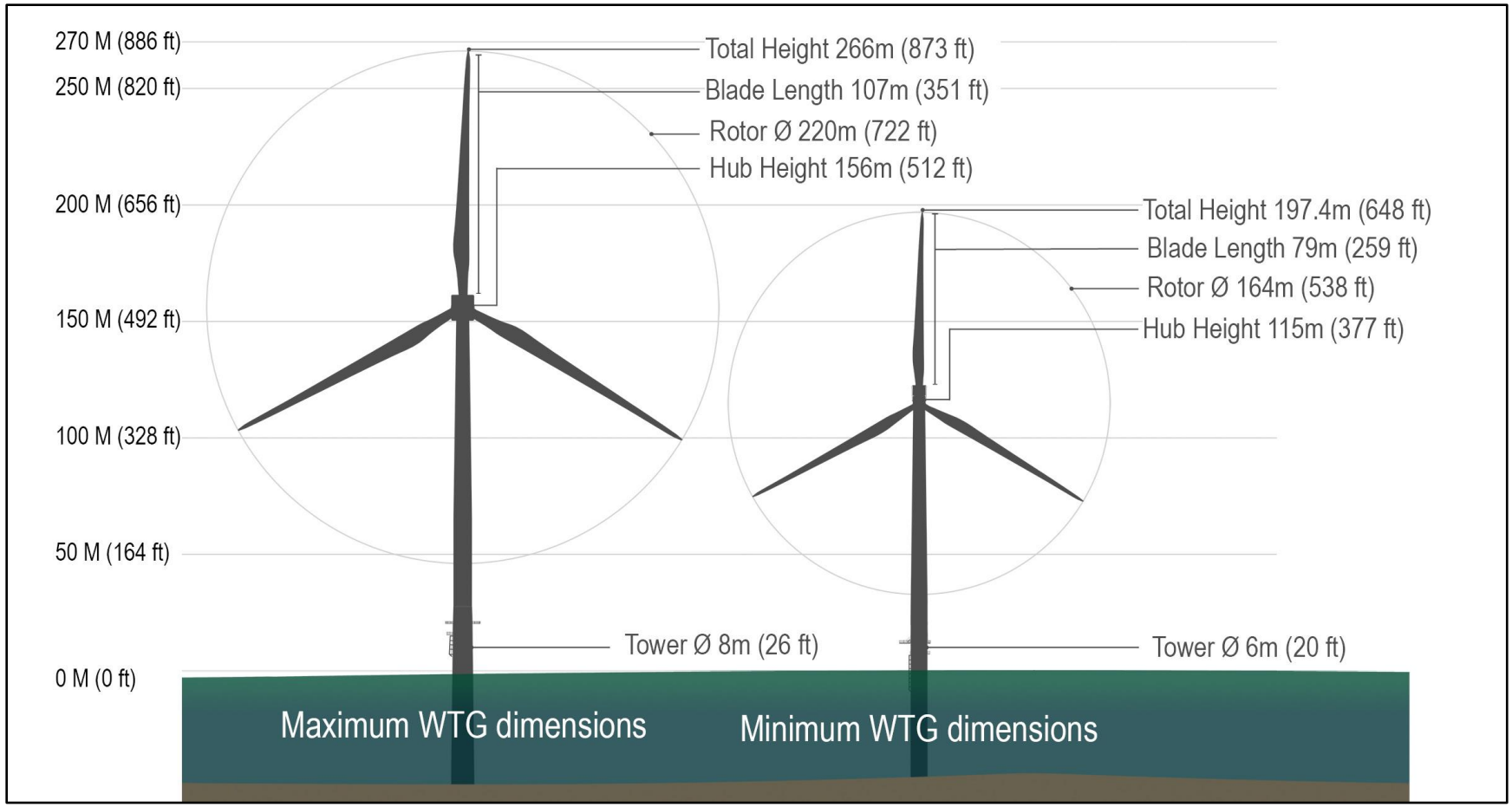


Figure 2.1-3. Wind turbine generator design envelope characteristics.

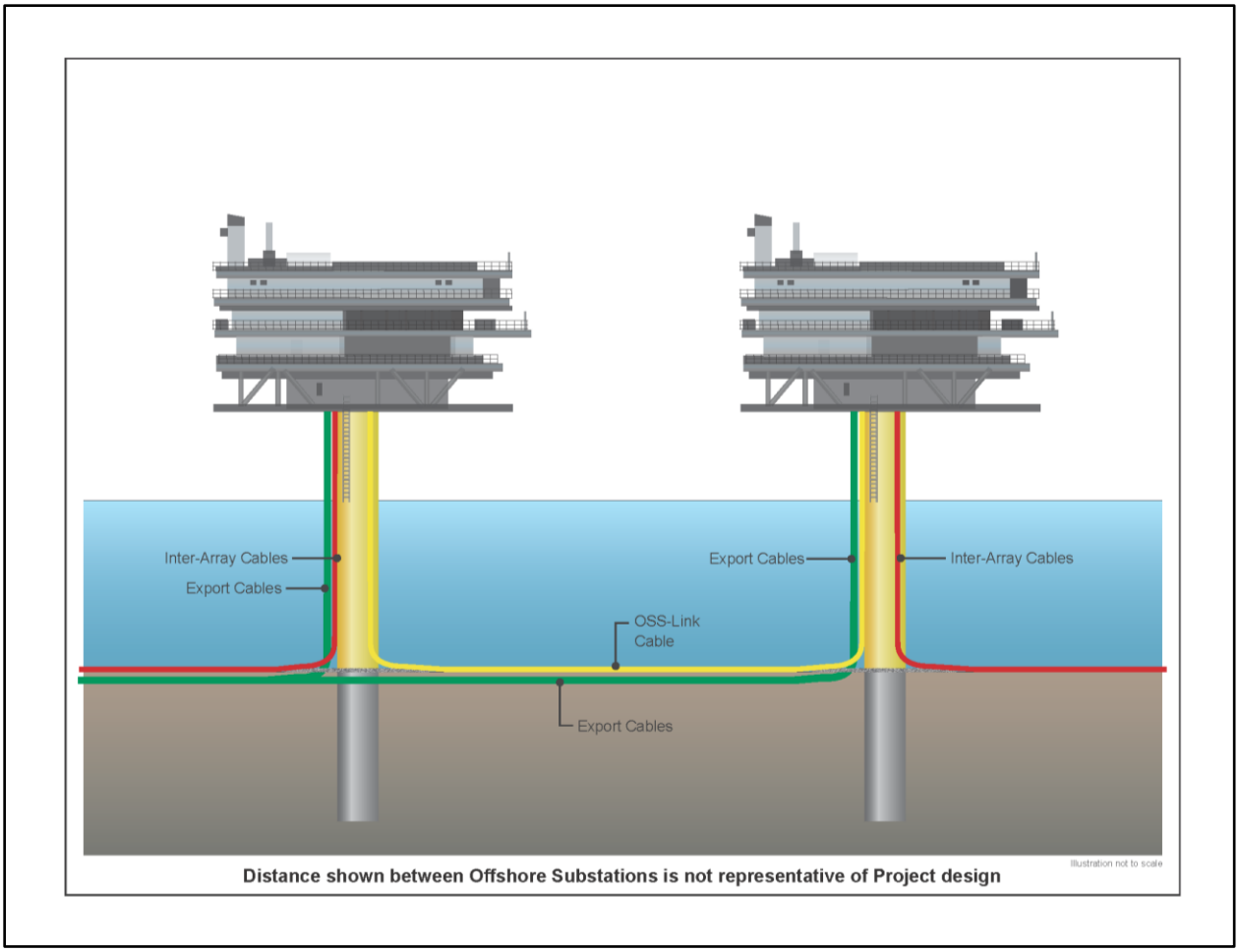
Table 2.1-3. Wind Turbine Generator Project Design Envelope Characteristics

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

Source: vhb (2021)

2.1.2.1.2 Offshore Substations

Up to two OSSs, each with a maximum nominal capacity of 440 MW, would be required to support the maximum design capacity (880 MW) of the Project. The OSS would be unmanned but could contain additional facilities such as breakrooms, locker facilities, and general storage for staff and equipment. The OSS would be installed on monopile foundations (Figure 2.1-4).



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

Figure 2.1-4. Indicative offshore substation co-location with associated cabling (vhb 2022).

2.1.2.1.3 Wind Turbine Generator Foundations and Offshore Substation Foundations

In the COP, monopile foundations are proposed as the preferred design option for WTGs and OSSs (COP Section 2.2.2.2). Monopile foundation types require tubular steel piles to be driven into the seafloor to a target depth of embedment (98–164 feet). Additional information on the foundation dimensions is provided in COP Tables 3.3.4-1, 3.3.4-2, and 4.1.1-1, and conceptual examples are depicted in COP Figures 3.3.4-1 to 3.3.4-3.

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

Final engineering design at the facility design report/facility installation report stage could indicate that scour protection is necessary for the WTG and OSS foundations (see Table 2.1-2 and Section 2.1.2.1). Scour protection is designed to prevent foundation structures from being undermined by hydrodynamic and sedimentary processes, resulting in seafloor erosion and subsequent scour hole formation. Several types of scour protection could be considered, including rock placement, mattress protection, sandbags, and stone bags. Rock placement, which involves the use of large quantities of crushed rock placed around the base of the foundation structure, is most frequently used (vhb 2022). Depending on the nature of the

rock used, the rock size would vary, but the average diameter would be approximately 8 inches. The footprint with scour protection would be a maximum of 0.7 acre for monopile foundations. Additional details for the engineering specifications and sourcing requirements for the rock use as scour protection for the Project are provided in COP Section 3.3.4.2.

2.1.2.1.5 Inter-Array Cables

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

2.1.2.1.6 Offshore Substation-Link Cable

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

Table 2.1-4. Offshore Substation-Link Cable Characteristics

OSS-Link Cable Characteristic	Maximum Design Scenario
Number of cables	1
Voltage	275 kV
Cable diameter	11.8 inches
Target burial depth (below seafloor)	4 to 6 feet*
Maximum disturbance depth	10 feet
Disturbance corridor (total width)†	Up to 131 feet

Source: vhb (2021)

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

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

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

OSS-Link Cable Disturbance	Construction Footprint	Operation Footprint
General disturbance corridor*	148 acres	–
Boulder clearance (60% of total length)	89 acres	–
Sandwave leveling and dredging (10% of total length)†	14.8 acres	–
Secondary cable protection (10% of total length)	–	4.4 acres

Source: vhb (2021)

Note: Disturbance estimates presented in this table are not additive because disturbance types may overlap (e.g., cable protection placed in areas where boulders were cleared). Vessel anchoring disturbances are not included; if anchoring (or a pull ahead anchor) is necessary during cable installation, it would occur within the APE and be centered on cable routes.

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

† Accounts for use of controlled flow excavation and/or trailing suction hopper dredger.

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

Cable protection in the form of rock berms, rock bags, and/or mattresses would be installed on the IAC and OSS-link cable where burial cannot occur, where sufficient burial depth cannot be achieved because of seafloor conditions, or to avoid risk of interaction with external hazards as determined necessary by the cable burial risk assessment, and where the cables cross existing submarine assets.[6] Cable protection would be installed from an anchored or dynamic positioning support vessel that would place the protection material over the designated area or areas.

The COP estimates up to 10% of the route for each IAC would require cable protection. Rock berm or concrete mattress separation layers would be installed over existing submarine assets prior to installing a crossing cable, whereas additional rock berm or concrete mattress cover layers would be installed over the crossing cable after cable installation. Similar to the IAC, the COP estimates up to 10% of the OSS-link cable route would require cable protection in areas where burial cannot occur, where sufficient burial depth cannot be achieved due to seafloor conditions, or to avoid risk of interaction with external hazards.

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

The lessee will provide the location of all cables and associated cable protection to NOAA's Office of Coast Survey after installation for inclusion on nautical charts.

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

2.1.2.1.8 Operations and Maintenance Facilities

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

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

Potential O&M Facility Sites	Description of Site-Specific O&M Facilities
Port of Brooklyn (New York)	There are no plans to construct new O&M buildings at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port as an O&M facility is assumed to be limited to use of existing facilities maintained by the port.
Port of Davisville at Quonset Point (Rhode Island)	As described and evaluated in the South Fork Wind Farm COP (Jacobs Engineering Group [Jacobs] 2021), new O&M building(s) with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point. This building may serve as an O&M base for multiple offshore wind projects.
Port of Galilee (Rhode Island)	There are no plans to construct new O&M buildings at, or otherwise implement improvements to, the Port of Galilee, and use of this port as an O&M facility is assumed to be limited to existing facilities maintained by the port.
Port Jefferson (New York)	There are no plans to expand or construct new O&M buildings at Port Jefferson. An existing upland building within an office park (Research Way) that includes other businesses would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. There are plans to conduct internal upgrades to the building to establish O&M office and warehouse space that would similarly support multiple offshore wind projects.
Port of Montauk (New York)	New O&M building(s) with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk.

Source: vhb (2021)

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

2.1.2.1.9 Port Facilities

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

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

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

2.1.2.2 Revolution Wind Export Cable Components

Power from the RWF would be delivered to the electric grid by two distinct transmission cable segments: the RWEC (offshore component) and the onshore transmission cable (onshore component). The RWEC corridor traverses both federal and Rhode Island state waters before reaching landfall (see Figure 1.1-1). Table 2.1-8 summarizes the RWEC components, which are described in more detail in the sections that follow. Additional information is provided in Appendix D. Figure 2.1-5 (COP Figure 1.1-2) provides a simplified Project schematic showing the components of the RWEC that deliver electricity from the OSS to the existing Davisville Substation.

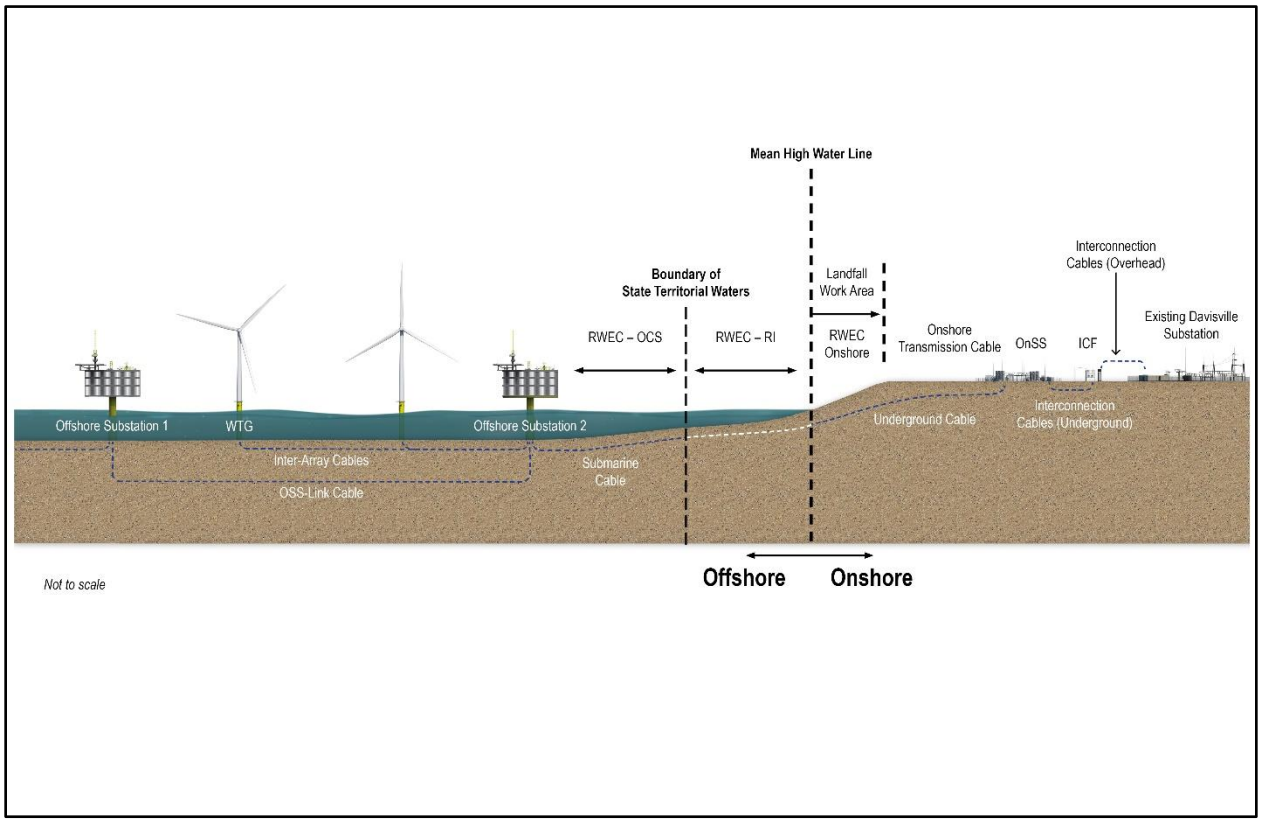


Figure 2.1-5. Simplified Project schematic (vhb 2022).

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

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
RWEC	RWEC offshore segment in federal waters (RWEC-OCS) and RWEC offshore segment in state waters (RWEC-RI)	Up to two 275-kV cables (one for each OSS) with a diameter of 11.8 inches and a target burial depth of 4 to 6 feet, a maximum disturbance depth of 13 feet, and a maximum disturbance corridor width of 131 feet per cable Total cable length up to 42 miles per cable with the RWEC-OCS segment totaling up to 19 miles and the RWEC-RI segment totaling up to 23 miles of each cable in Rhode Island state waters and extending to landfall The RWECs would be located within the same corridor. Offshore and based on site-specific conditions (e.g., water depth and seabed constraints), each cable would typically be spaced greater than 164 feet apart; spacing between each cable would be less at landfall (e.g., approximately 23–49 feet).	RWEC-OCS:* General disturbance corridor = 593.1 acres Boulder clearance (40% of route for two cables) = 237.2 acres Sandwave leveling and dredging (45% of route for two cables) = 266.9 acres RWEC-RI: General disturbance corridor = 731.4 acres Boulder clearance (70% of route for two cables) = 512 acres Sandwave leveling and dredging (7% of route for two cables) = 51.2 acres	Project easement: 1,640 feet wide centered on the cable (up to 42 miles in length) = 8,349 acres
RWEC cable protection	RWEC-OCS and RWEC-RI	In the form of rock berms, concrete mattresses, fronded mattresses, and/or rock bags, as follows: Cable protection for RWEC for 10% of route length, up to 39.4 feet wide Cable protection for existing submarine assets (seven identified) anticipated to be crossed by RWEC: up to 4.4 mi in length, up to 39.4 feet wide	RWEC-OCS (10% of route) = 17.8 acres RWEC-RI (10% of route) = 21.9 acres Existing submarine assets (seven identified) anticipated to be crossed by RWEC = 20.8 acres	Same

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
RWEC (onshore transmission cable)	Onshore	Two 275-kV cables spliced into two 275-kV transmission circuits with three cables each (total of six cables in two circuits) Diameter of 5.1 inches with a target burial depth of 3 to 6 feet, a maximum disturbance depth of 13 feet and 16 feet at splice vaults, a maximum disturbance corridor width of 25 feet, and a disturbance area at splice vaults Cable length up to 1.0 mile	Temporary ground disturbance: 3 acres	RWEC operational ROW: 20 feet wide centered on the cable approximately 1 mile in length = 2.4 acres
Landfall work area	RWEC-RI and onshore Quonset Point North Kingstown, Rhode Island	Landfall work area (includes transition joint bays, with horizontal directional drilling (HDD) exit pits and cofferdams)[†] Transition joint bay Horizontal directional drilling exit pits and temporary cofferdams	3.1 acres[‡] 1,340 square feet 0.24–0.94 acre	N/A
OnSS	Onshore	Two 275-kV onshore transmission circuits transitioning to aboveground and terminating at the OnSS at two aboveground circuit terminals OnSS nominal operating capacity ranging between 704 and 880 MW, connecting to the ICF with two 115-kV underground transmission cables Maximum height of OnSS equipment up to 45 feet and shielding masts up to 65 feet	Up to 7.1 acres with maximum depth of disturbance of 60 feet	OnSS equipment: 3.8 acres OnSS facility: 7.1 acres[§] Underground transmission cable (connecting to ICF) operational ROW: 20 feet wide centered on the cable approximately 527 feet in length = 0.24 acre

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
ICF	Onshore	ICF nominal operating capacity of up to six 115-kV breakers, connecting to the Davisville Substation with two 115-kV overhead transmission circuits Maximum height of ICF equipment up to 45 feet and shielding masts up to 55 feet Maximum height of overhead transmission circuit structures (ICF to Davisville Substation) up to 60 feet Maximum height of overhead transmission circuit structures (ICF to rebuilt Davisville Transmission Tap line) up to 80 feet	Approximately 4.0 acres with a maximum depth of disturbance of 60 feet	Up to 1.6 acres Overhead transmission circuit (ICF to Davisville Substation) ROW: Up to 120-foot-wide cleared ROW centered on the circuit for two circuits approximately 474 feet in length = 1.3 acres Overhead transmission circuit (ICF to rebuilt Davisville Transmission Tap line) ROW: Up to 120-foot-wide cleared ROW centered on the circuit for approximately 712 feet in length = 1.9 acres

Source: vhb (2021)

Note: For a detailed description of assumptions used to develop the footprint estimates, see COP Tables 3.2.2-1, 3.3.3-1, 3.3.3-2, and 3.3.3-4.

* Boulder clearance disturbance area and sandwave leveling and dredging disturbance area would occur within the general disturbance corridor area.

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

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

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

2.1.2.2.1 Offshore Segments

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

2.1.2.2.2 Offshore Cable Protection

Seven known submarine assets exist along the RWEC (refer to Appendix E for discussion and Figure 3.17-1 in Other Uses). Additionally, the COP assumes the RWEC would cross two to four of the Project's own IACs (vhb 2022). See Figure 1.1-1 for a depiction of the potential grid layout of WTGs and OSSs with OSS-link cable and IACs.

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

2.1.2.2.3 Onshore Segments

The onshore segment of the RWEC (the onshore transmission cable) originates where the offshore segment of the RWEC comes ashore in the landfall work area, transitions from two larger diameter cables to six smaller diameter cables, running in two parallel circuits in the same trench, and proceeds underground to the OnSS and the ICF. Two fiber-optic cables would also be included in the interstitial space between the six cables for the length of the onshore transmission cable for monitoring. Up to two splice vaults would be required for each circuit (up to four total) of the onshore transmission cable between landfall and the OSS. See COP Figure 3.3.2-2 and Figure 3.3.2-1 for illustrations of the onshore transmission cable cross section and circuit configuration. See Figure 2.1-2 (COP Figure 2.2.1-3) for the proposed location of the onshore transmission cable path, OSS, ICF, and onshore work areas. Additional details of the onshore transmission cable design are found in Section 3.3.2 of the COP (vhb 2022).

Landfall Work Area

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

Installation of the RWEC at the landfall work area would be accomplished using a horizontal directional drilling (HDD) methodology originating offshore incorporating either a cofferdam configuration or an exit pit with no surface casing and goal posts (see Table 2.1-8). If needed, based on site conditions at the landfall work area, a cofferdam would be used to create a dry environment during construction and to manage sediment, contaminated soils, and bentonite (for HDD operations). The cofferdam, measuring up to 164 × 33 × 10 feet to align with HDD exit pits, could be installed as either a sheet piled structure into the seafloor or a gravity cell structure placed on the seafloor using ballast weight, and installation would be conducted from an offshore work barge anchored near the cofferdam. A barge could be required to anchor at or near the exit point of the HDD duct during construction, regardless of whether a cofferdam is used or not. One cofferdam would be needed for each of the two cables that make up the RWEC. Alternatively, instead of a cofferdam, an exit pit with or without the use of surface casing pipe and goal posts measuring up to 182 x 113 x 10 feet would be deployed. The area of ground and seafloor disturbance estimated for construction at the RWEC landfall location is 3.1 acres. See COP Section 3.3.3.2 for further details on the construction methods available under the PDE for use with HDD operations.

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

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

Within each transition joint bay, the incoming RWEC (offshore) cable would be spliced into three onshore cables. The sheaths from the RWEC and the onshore transmission cable would be terminated into the link box via the cable joints. The fiber-optic cables from the RWEC and onshore transmission cable would be joined inside the fiber-optic joint box. In total, there would be two transition joint bays, each with one link box and one fiber-optic cable joint box (Figure 2.1-6 [COP Figure 3.3.3-1]).

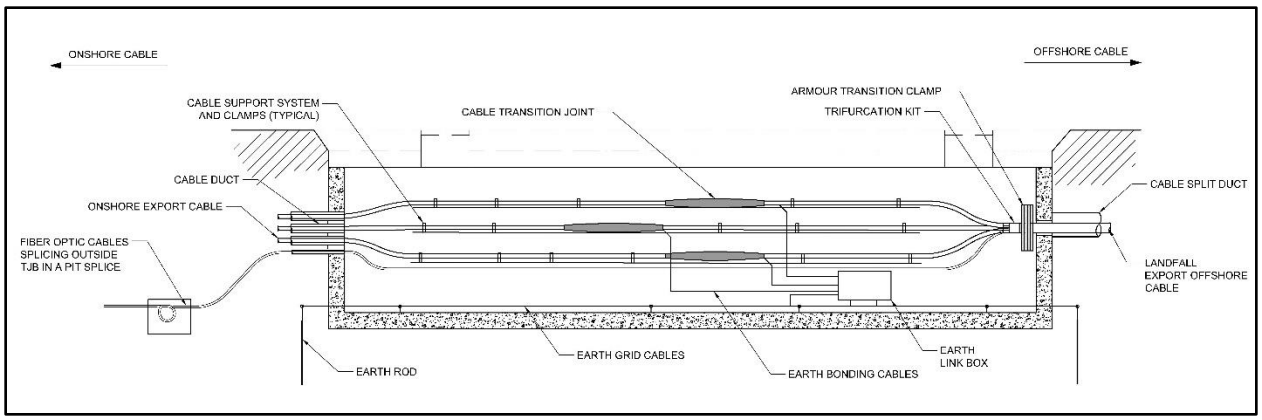


Figure 2.1-6. Transition joint bay and link box schematic (vhb 2022).

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

Onshore Transmission Cable

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

Onshore Substation and Interconnection Facility

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

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

Onshore Substation

The OnSS would have a nominal operating capacity between 704 and 880 MW. The maximum height of the OnSS equipment would be up to 45 feet, with shielding masts measuring up to 65 feet tall. The OnSS would be located on two adjacent parcels totaling 15.7 acres, both owned by the Rhode Island Commerce Corporation and include a compacted gravel driveway, stormwater management features, and associated

landscaped or managed vegetation areas totaling up to 7.1 acres inclusive of the up to 4-acre operational footprint of the facility. Backup power for the OnSS would be provided via a 50-kW generator fed by portable propane tanks.

Interconnection Facility

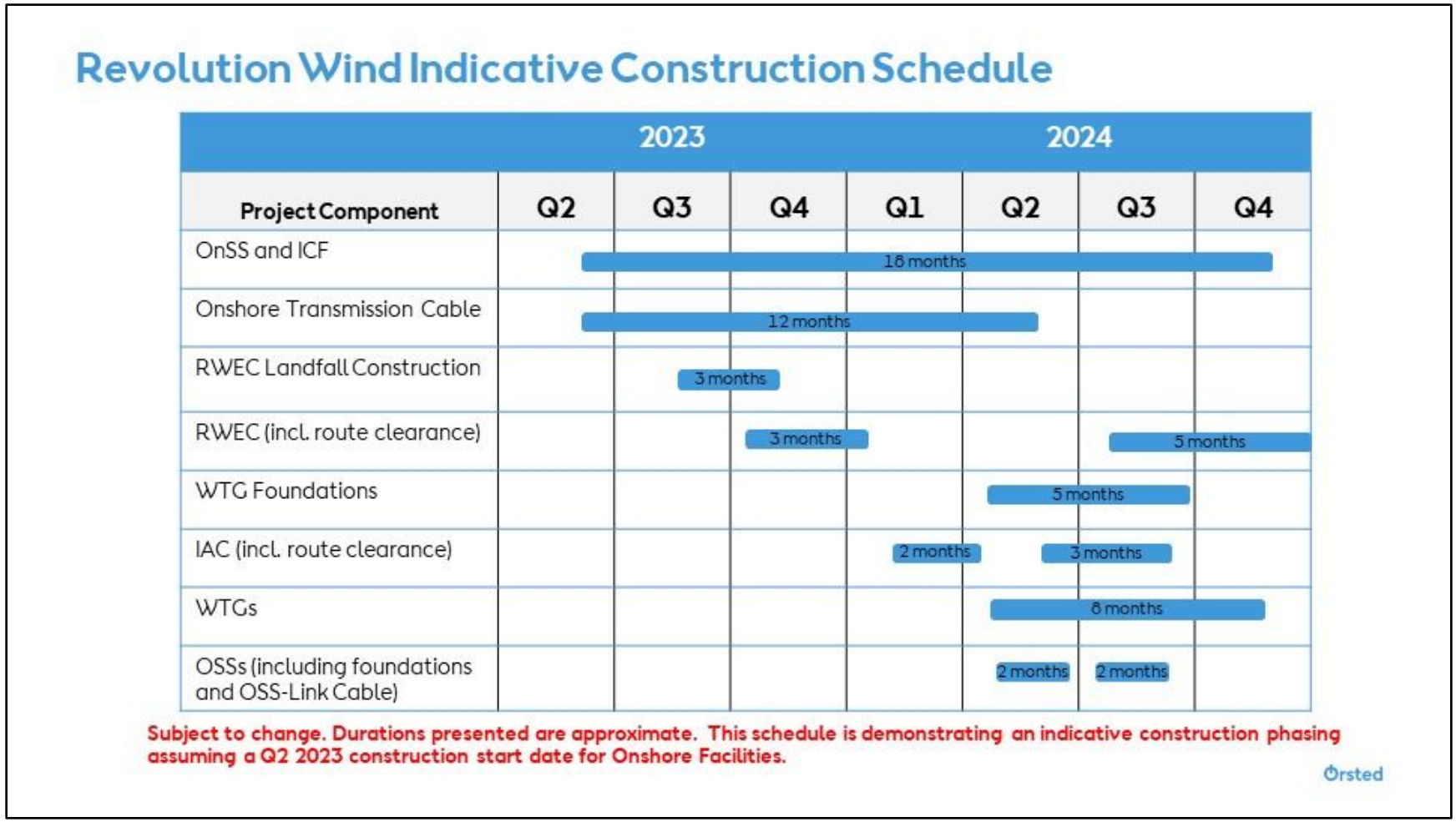
The ICF would be located on a 6.1-acre parcel (owned by TNEC) adjacent to the OnSS and occupy an operational footprint of up to 1.6 acres. The maximum height of ICF equipment would be up to 45 feet, with shielding masts measuring up to 55 feet tall. Additionally, the ICF would include an asphalt paved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

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

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

2.1.2.3 Construction and Installation

Construction and installation of the RWF and RWEC are scheduled to take place over 2 years within applicable seasonal work windows. Construction could begin as early as the first quarter of 2023 with the installation of onshore components and initiation of seafloor preparation activities. Approximate construction durations for the different Project components are provided in Figure 2.1-7, with some expected to overlap.



Notes: IAC = inter-array cable; ICF = interconnection facility; OnSS = onshore substation; OSS = offshore substation; RWEC = Revolution Wind Export Cable; WTG = wind turbine generator.

Figure 2.1-7. Revolution Wind Farm indicative construction schedule (Roll 2021a).

2.1.2.3.1 Offshore Activities and Facilities

Vessels and Vehicles

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

Table 2.1-9. Summary of Revolution Wind Farm Marine Vessel Emission Sources

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

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

Source: Tech Environmental (2021)

Table 2.1-10. Summary of Revolution Wind Farm Helicopter Emission Sources

Project Phase	Project Component	Port Used	Helicopter Types (counts)
Installation	Foundations	Port of Davisville at Quonset Point, Rhode Island	Twin medium (2)
O&M	O&M	Port of Davisville at Quonset Point, Rhode Island, orPort of Galilee, Rhode Island	Twin medium (1)

Source: Tech Environmental (2021)

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

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

Transportation and Installation of Foundations

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

Before the foundations are installed, geophysical; geotechnical; and munitions, explosives of concern, and unexploded ordnance (UXO) surveys would be conducted in addition to seafloor debris clearance. Monopile foundations would be driven to target embedment depths (98 to 168 feet below the seafloor) using impact pile driving and/or vibratory pile driving.

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

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

Wind Turbine Generators

WTG components would be transported to the laydown construction port to prepare components for loading and installation. Activities include pre-assembling tower sections as well as preparing the nacelles, blades, and equipment necessary for WTG installation. The WTGs would then be transported to the Lease Area by either an installation vessel or feeder vessel. The installation vessel would install the tower as a single lift, if preassembled, or in multiple lifts for separate sections. The tower would be bolted to the foundation. The nacelle would then be installed on top of the tower and bolted in place. The blades would be installed as a pre-assembled full rotor or in single lifts. Once the WTG installation is complete, the installation vessel would move on to the next WTG installation location. Commissioning of the turbine would be executed by commissioning technicians working from separate commissioning vessels. Installation of a WTG is estimated to take up to 36 hours, allowing for vessel positioning and completion of all lifts; however, to allow time for vessel maneuvering between WTG locations, as well as weather down time, the total duration of the installation campaign for the WTGs is expected to be approximately 8 months. Short-term construction-related seafloor disturbance for WTGs and OSSs would include

sandwave leveling, dredging, and boulder clearance. Vessel anchoring would also result in short-term seafloor disturbance and would occur within a 656-foot radius around WTG and OSS foundation locations. Additional WTG details are described in Section 2.1.2.1.1 and Appendix D.

Offshore Substations

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

Cable Systems

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

Inter-Array Cables

The IACs would be installed within a 131-foot-wide disturbance corridor. Prior to main cable installation activities, cable lay and burial trials could occur within the disturbance corridor. The target burial depth for the IACs would be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific cable burial risk assessment. Prior to installation, seafloor preparation would include boulder clearance and sandwave leveling. The COP assumes that a boulder plow could be used in all areas of higher boulder concentrations, conservatively estimated at up to 80% of the entire IAC network. Up to 10% of the total IAC network could also require sandwave leveling and/or dredging to facilitate cable installation. A cable laying vessel would be preloaded with the IACs. Prior to the first end-pull, the cable would be fitted with a cable protection system, and the cable would be pulled into the WTG or OSS. The vessel would then move toward the next WTG (or OSS).

Cable laying and burial could occur simultaneously using a lay and bury tool, or the cable could be laid on the seafloor and then trenched post-lay. Alternatively, a trench could be precut prior to cable installation. The pull and lay operation, inclusive of fitting the cable with a cable protection system, would then be repeated for the remaining IAC lengths, connecting the WTGs and OSSs together. Burial of the IACs would target a depth of 4 to 6 feet below seafloor. During cable installation, scenarios could exist where installation to the target burial depth is not achievable using the primary installation methodologies due to mechanical problems with the trencher, adverse weather conditions, and/or

unforeseen soil conditions. As a result, controlled flow excavation could be used and would involve using a stream of water to fluidize the sands around the cable, which allows the cable to settle into the trench under its own weight. No in-field joints would be used for IAC construction; however, they could be used in the case of cable repair. COP Section 3.3.7 provides design and construction details for the IACs. Refer to Section 2.1.2.3.7 for a discussion of IAC protection. The final installation methods and target burial depths would be determined by the final engineering design process, informed by detailed geotechnical data, discussion with the chosen installation contractor, and coordination with regulatory agencies and stakeholders. Detailed information on the final technique(s) selected would be submitted to and approved by BOEM through the facility design report/facility installation report review processes prior to construction.

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

Revolution Wind Export Cable Offshore Segments

Construction staging and installation for the offshore RWEC would generally be as described for the IACs. Dynamic positioning support vessels would be used for cable burial activities. Anchoring would occur within the project easement, if used. Refer to Section 2.1.2.2 and Table 2.1-3 for details on the RWEC component construction and operational methods and footprints and project easements.

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

Landfall Construction

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

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

also require the installation of other temporary sheet piles to aid in the anchoring of the rig and/or to provide soil stabilization of the excavated area (vhb 2022).

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

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

Offshore Substation-Link Cable

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

2.1.2.3.2 Onshore Activities and Facilities

Vehicles

Construction of the Project would require the support of onshore construction equipment and vehicles provided in Table 2.1-11. See COP Section 3.3.10.2 for a discussion and listing of the number of vehicle trips by various construction tasks.

Table 2.1-11. Summary of Onshore Equipment Emission Sources

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

Source: Tech Environmental (2021)

Onshore Transmission Cable

Construction of the onshore transmission cable would involve site preparation, duct bank installation, cable installation, cable jointing, final testing, and final restoration (described in greater detail in COP Table 3.3.2-2). Installation would generally require excavation of an approximate 8-foot-wide trench within a 25-foot-wide temporary disturbance corridor; however, the disturbance area at the transition joint bays would be 30 feet wide × 75 feet long. The approximately 1-mile-long onshore transmission cable ROW would be maintained free of vegetation that exceeds 15 feet in height.

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

As stated in Section 2.1.2.2.3, the onshore transmission cable would be installed within a duct bank, buried to a target depth of 3 to 6 feet to the top of the duct bank, and be consistent with local utility standards. The conduits would be encased in a concrete duct bank and installed in an open trench for most of the Project. Once excavated, the open trench would be supported by a shoring system to allow for installation of the conduits inside the trench. The conduits would be held in place using conduit spacers to allow the concrete to be poured and set between each duct without allowing the formation of any air pockets or voids. This would be repeated until all conduits and concrete have been installed to the specified jointing locations (manholes, termination structures, etc.). At the completion of the installation, all conduits would be proofed and mandreled[7] to verify continuity of the raceway for cable installation. The cable would be pulled through the raceway and cut, leaving a sufficient amount of slack to perform the jointing operations. After pulling, the integrity of each cable jacket would be tested, and the cables would be sealed to prevent moisture ingress until the cables are spliced/jointed. Splicing would occur after all the cables for a specific section have been pulled into the jointing bay or termination section. Two splice vaults per circuit (four total) would be required along the onshore transmission cable route. Each splice vault measures 30 × 8 × 8 feet (see Table 2.1-3). The splice vaults would be buried to a depth of up to 16 feet to the bottom of the vault. The entire temporary disturbance corridor would be restored to preconstruction conditions following installation of the onshore transmission cable. Construction of the

[7] Mandrels are used to test the integrity of the conduit runs and remove small amounts of debris. Refer to Table 3.3.2-2 of the COP (vhb 2022).

onshore transmission cable from the transition joint bays to the OnSS would result in up to 3.1 acres of temporary ground disturbance, with no permanent disturbance anticipated (see Table 2.1-3). Construction of the onshore transmission cable would take approximately 12 months.

Onshore Substation and Interconnection Facility

The maximum area of land disturbance associated with the construction of the OnSS and ICF is depicted in COP Figure 3.3.1-1. Table 2.1-3 and Section 2.1.2.2.3 provide construction and operation disturbance acreage for the OnSS and ICF. Contingency staging and laydown areas also include previously disturbed areas owned by the Quonset Development Corporation; staging and laydown in these areas would not require grading but could require graveling, erosion control, fencing, etc. Temporary disturbances would be associated with temporary work areas and staging and laydown areas. OnSS and ICF equipment and steel support structures would be supported by reinforced concrete foundations on drilled shafts suitable for existing soil conditions and coastal storm events and flood events. The maximum depth of disturbance associated with construction of the OnSS and ICF is 60 feet.

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

Once construction is complete, temporary disturbance areas beyond the operational footprint of both the OnSS and ICF would be restored to preconstruction conditions. Construction of the OnSS and ICF would take up to 18 months. Construction of the OnSS and ICF would generate approximately 3,000 cubic yards (cy) of solid waste, which would be disposed of in a landfill and/or recycling center.

2.1.2.4 Operations and Maintenance

The proposed Project is anticipated to have an operating period of 35 years.[8] Revolution Wind would use a variety of vessels to support O&M, including SOVs with deployable work boats (daughter craft[9]), crew transfer vessels, jack-up vessels, and cable laying vessels. To support O&M, the Project would be

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

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

controlled 24 hours a day/7 days a week via a remote surveillance system (i.e., SCADA). As stated in Section 2.1.2.1.8, Revolution Wind is evaluating five ports (Port of Brooklyn, Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, and Port of Montauk) to support O&M for the Project.

2.1.2.4.1 Offshore Activities and Facilities

During operations and maintenance, Revolution Wind would employ a proprietary state-of-the-art asset management system to inspect offshore transmission assets, including the OSS (electrical components), RWEC, IACs, and OSS-link cable, which would provide a data-driven assessment of the asset condition and would allow for prediction and assessment of whether inspections and/or maintenance activities should be accelerated or postponed. The RWEC, IACs, and OSS-link cable typically have no maintenance requirements unless a fault or failure occurs.

Cable protection placed during installation could require replacement or remediation over the lifetime of the Project. These maintenance activities are considered non-routine. If cable repair or replacement or remedial cable protection is required, Revolution Wind would obtain necessary approvals. These activities would be limited to the disturbance corridors previously defined for construction, as stated in Tables 2.1-1 and 2.1-3.

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

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

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

Vessels and Vehicles

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

2.1.2.4.2 Onshore Activities and Facilities

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

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

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

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

Vehicles

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

2.1.2.5 Decommissioning

Pursuant to 30 CFR 585, Revolution Wind would be required to remove or decommission all offshore and onshore installations and clear the seafloor of all obstructions created by the Project. If the COP is approved or approved with modifications, Revolution Wind would have to submit a bond that would be held by the U.S. government to cover the cost of decommissioning the entire facility. In accordance with applicable regulations and a BOEM-approved decommissioning plan, Revolution Wind would have up to 2 years to decommission the Project following termination of the lease (up to 35 years postconstruction). Decommissioning would return the area to preconstruction conditions, as feasible, barring the replacement of naturally occurring seafloor obstructions such as boulders. All facilities would be removed to a depth of 15 feet below the mudline, unless otherwise authorized by BOEM (30 CFR 585.910(a)).

Revolution Wind would submit a decommissioning application prior to any decommissioning activities and BOEM would conduct a determination of NEPA adequacy at that time, which could result in the preparation of additional NEPA analyses. Revolution Wind would develop a decommissioning plan for the facility that complies with all relevant permitting requirements. This plan would account for changing

circumstances during the operational phase of the Project and would reflect new discoveries, particularly in the areas of marine environment, technological change, and any relevant amended legislation.

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

2.1.2.6 Environmental Protection Measures and Additional Authorizations

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

2.1.2.7 Survey and Monitoring Activities

As part of the Proposed Action, Revolution Wind has committed to conducting preconstruction, during construction, and postconstruction surveys and monitoring (Table 2.1-12). Revolution Wind is conducting the surveys and monitoring under existing permits, where appropriate, prior to approval of the COP. These survey and monitoring efforts are included in Table 2.1-12 and in Tables F-1 and F-2 in Appendix F and could be required by BOEM in the ROD.

Table 2.1-12. Revolution Wind Survey Monitoring Activities

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

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

Sources: Roll (2021b); vhb (2021)

2.1.3 Alternative C: Habitat Alternative

Alternative C (Habitat Impact Minimization Alternative), hereafter referred to as the Habitat Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the RWF COP (vhb 2022). To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be omitted while maintaining a uniform east–west and north–south grid of 1 × 1–nm spacing between WTGs (Figures 2.1-8 and 2.1-9). The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than proposed by the lessee would be approved by BOEM. Under this alternative, BOEM could select one of the alternatives in Table 2.1-13.

Table 2.1-13. Alternative C Alternatives

Alternative	Descriptions
C1	This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east–west and north–south grid of 1 × 1–nm grid spacing between WTGs. Under this alternative, up to 65 WTGs would be approved.
C2	This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east–west and north–south grid of 1 × 1–nm grid spacing between WTGs. Under this alternative, up to 64 WTGs would be approved.

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

Alternative C1 reduces development in areas of contiguous complex habitat slightly more than Alternative C2. Alternative C2 shifts exclusion of three WTG positions from the southeastern portion to areas further north to reduce development in or adjacent to known cod spawning areas, however, resulting in slightly less complex habitat avoided when compared to Alternative C1. See Chapter 3.6.2.4 for more information on differences in impacts to complex habitats. BOEM, in coordination with NMFS, considered a total of four alternatives to Alternative C prior to narrowing the selection to the two alternatives illustrated in Figures 2.1-8 and 2.1-9. Appendix K provides additional rationale on the evolution of Alternatives C1 and C2.

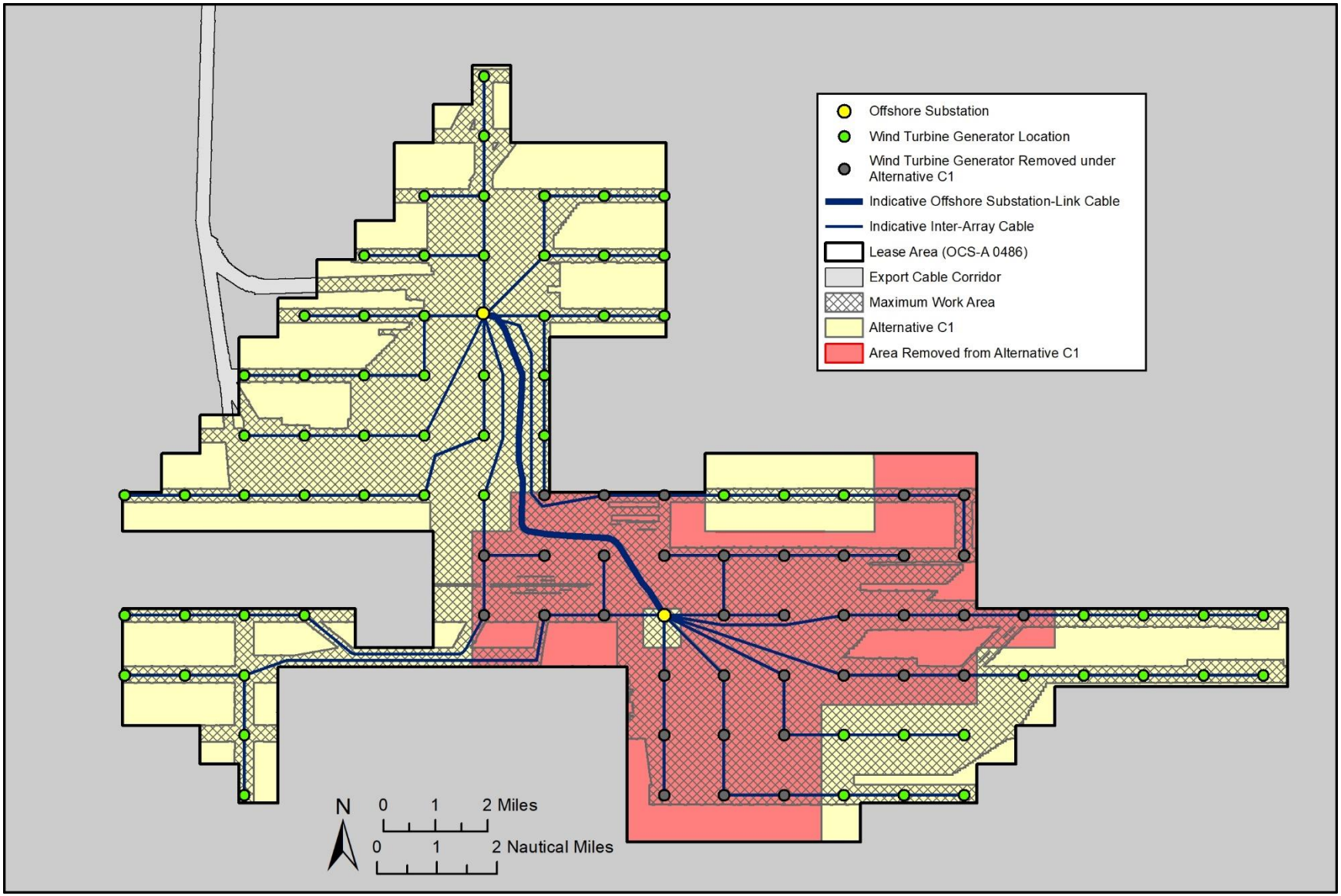


Figure 2.1-8. Project location and components under the Habitat Alternative C1.

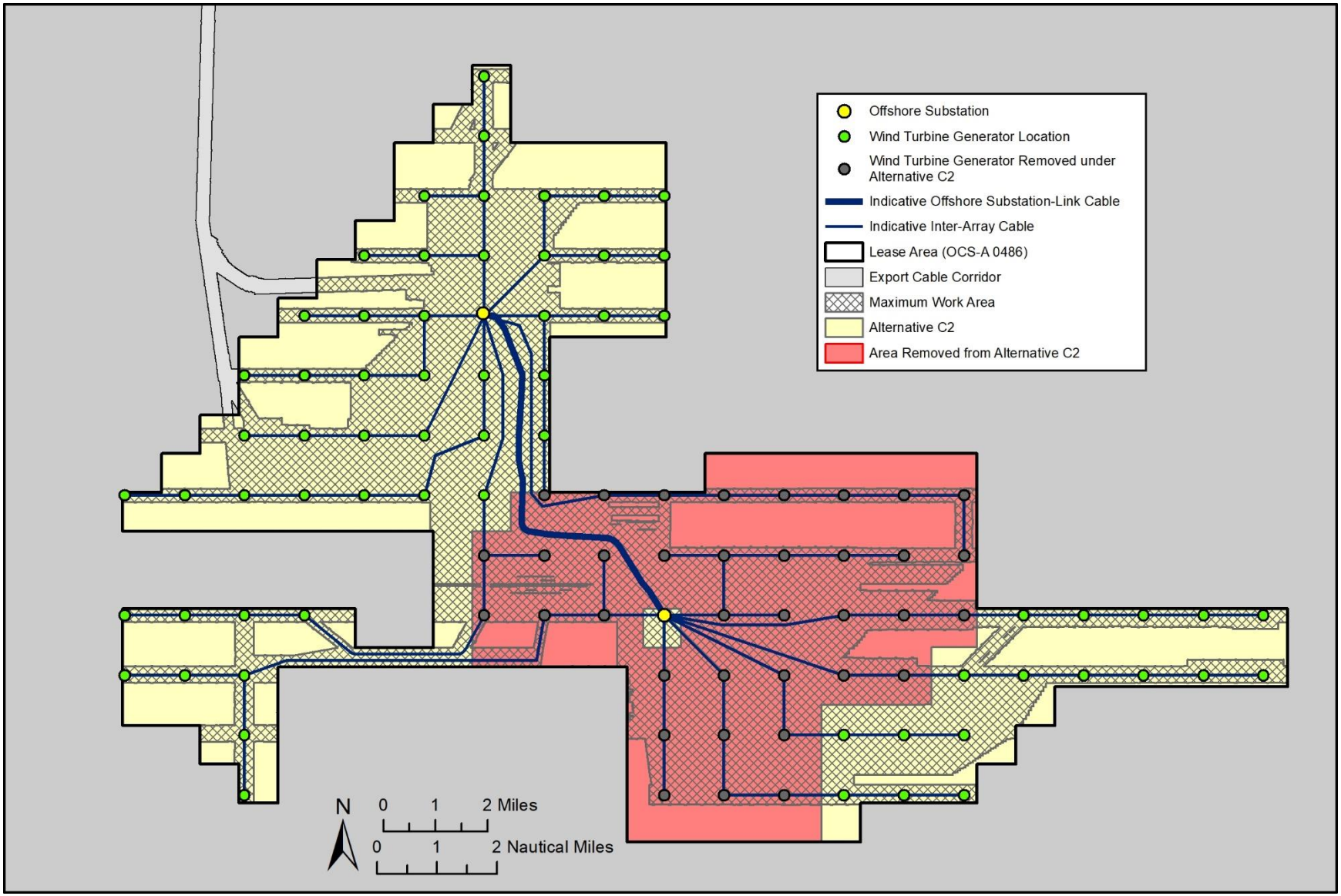


Figure 2.1-9. Project location and components under the Habitat Alternative C2.

2.1.4 Alternative D: Transit Alternative

Alternative D (No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative), hereafter referred to as the Transit Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the RWF COP (vhb 2022). However, to reduce navigation risks and conflicts with other competing space uses, WTGs adjacent to the Buzzard's Bay Traffic Separation Scheme Inbound Lane or overlapping transit lanes proposed by stakeholders, and areas of Cox Ledge, would be eliminated while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs (Figures 2.1-10, 2.1-11, and 2.1-12). Under this alternative, fewer WTG locations (and probably fewer miles of IACs) than proposed by the lessee would be approved by BOEM while still allowing for the fulfillment of existing PPAs up to the maximum capacity identified in the PDE (i.e., 880 MW). Under this alternative, BOEM could select one of the alternatives in Table 2.1-14.

Table 2.1-14. Alternative D Alternatives

Alternative	Descriptions
D1	Removal of the southernmost row of WTGs, which overlap the 4-nm east–west transit lane proposed by the Responsible Offshore Development Alliance (RODA)[10] (Figure 2.1-10). Selecting this alternative would remove up to seven WTGs and associated IACs from consideration while maintaining the east–west and north–south 1 × 1–nm grid spacing.
D2	Removal of the eight easternmost WTGs, which overlap the 4-nm north–south transit lane proposed by RODA (Figure 2.1-11). Selecting this alternative would remove up to eight WTGs and associated IACs from consideration while maintaining the east–west and north–south 1 × 1–nm grid spacing.
D3	Removal of the northwest row of WTGs adjacent to the Buzzard's Bay Traffic Separation Scheme Inbound Lane (i.e., traffic separation scheme; Figure 2.1-12). Selecting this alternative would remove up to seven WTGs and associated IACs while maintaining the east–west and north–south 1 × 1–nm grid spacing.

The seven possible combinations of the three alternatives to Alternative D that are analyzed in this EIS are listed in Table 2.1-15 and are illustrated in Figures 2.1-10 through 2.1-16.

Table 2.1-15. Alternative D Alternatives Combinations

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

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

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

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

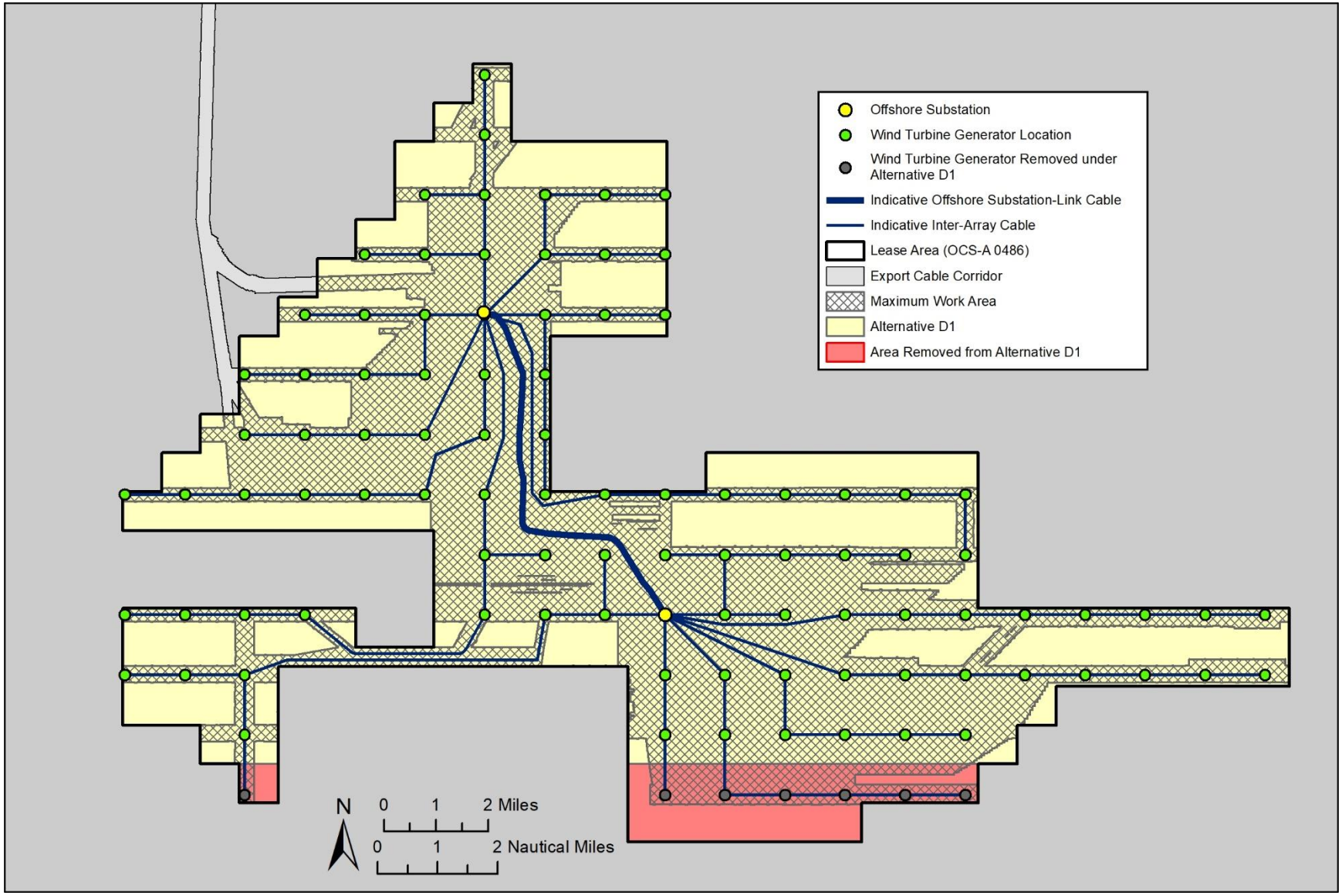


Figure 2.1-10. Project location and components under the Transit Alternative D1.

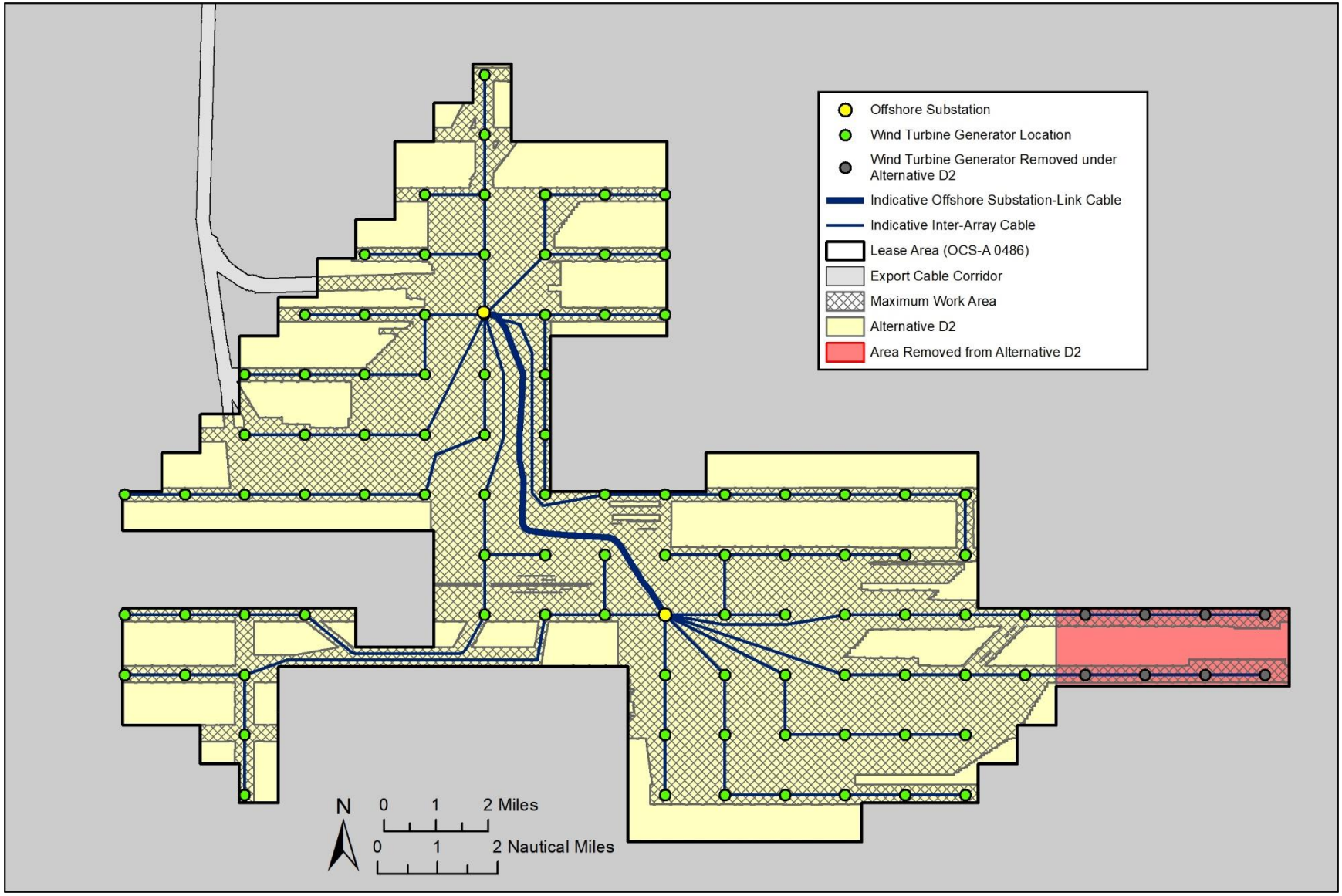


Figure 2.1-11. Project location and components under the Transit Alternative D2.

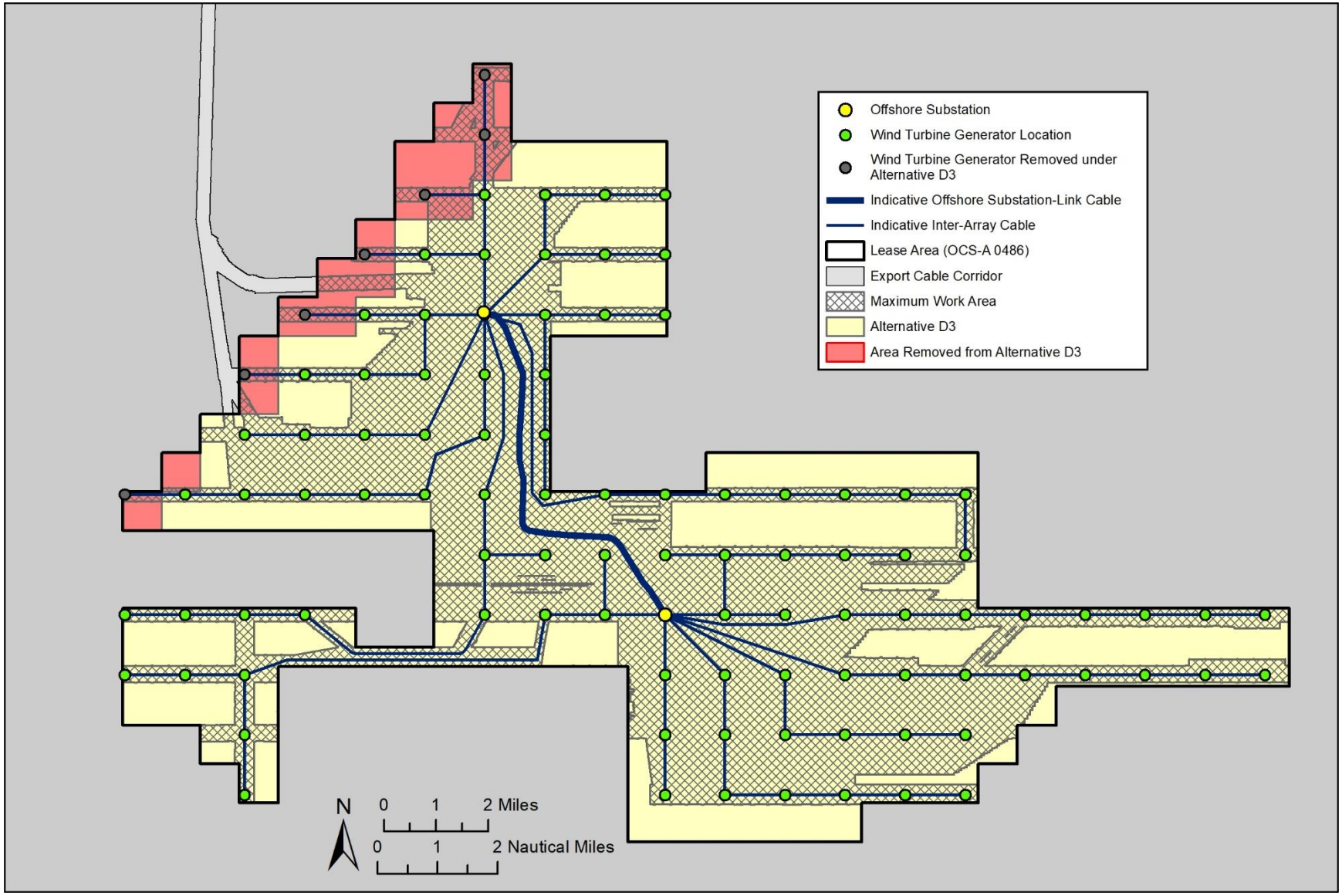


Figure 2.1-12. Project location and components under the Transit Alternative D3.

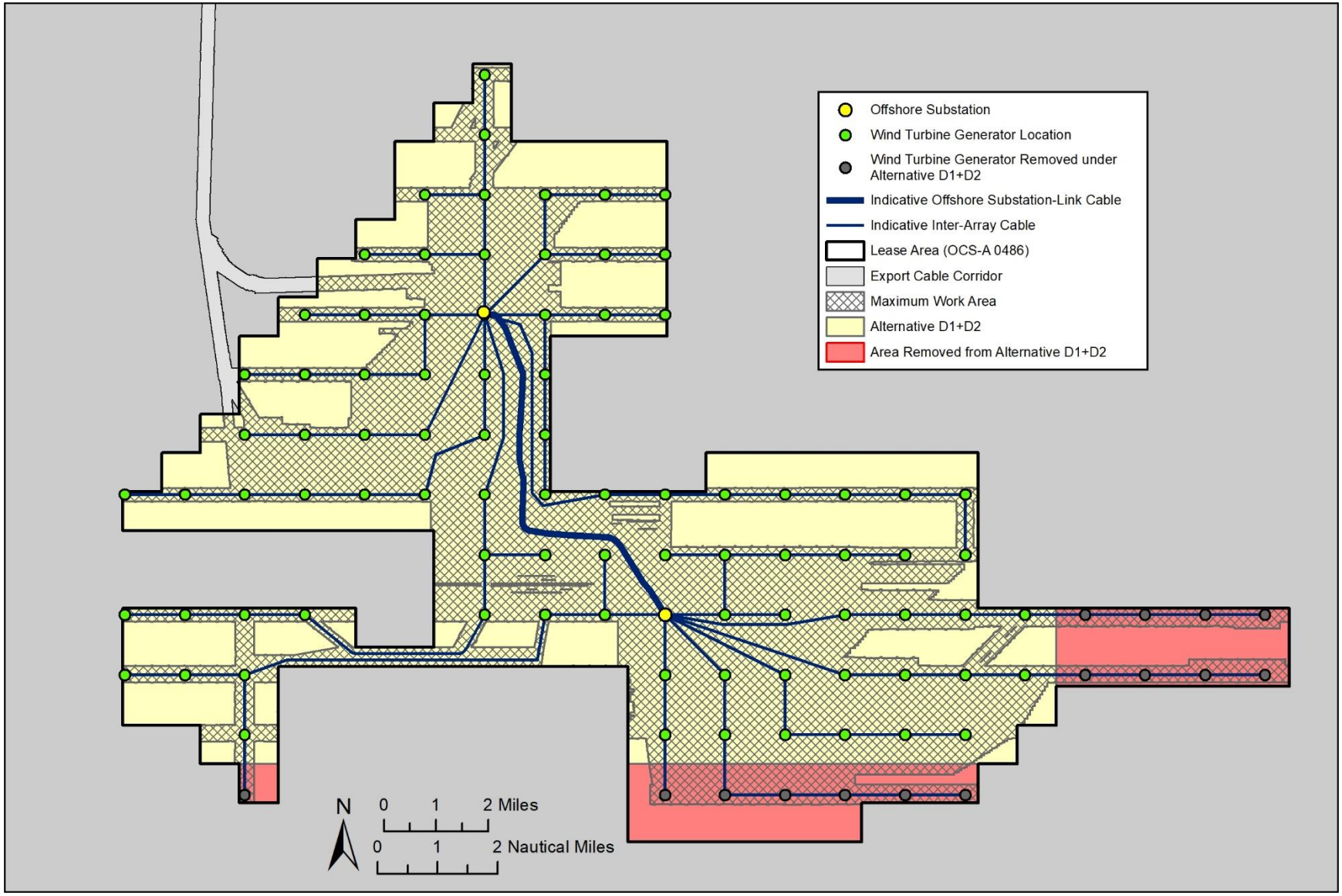


Figure 2.1-13. Project location and components under the Transit Alternative D1+D2.

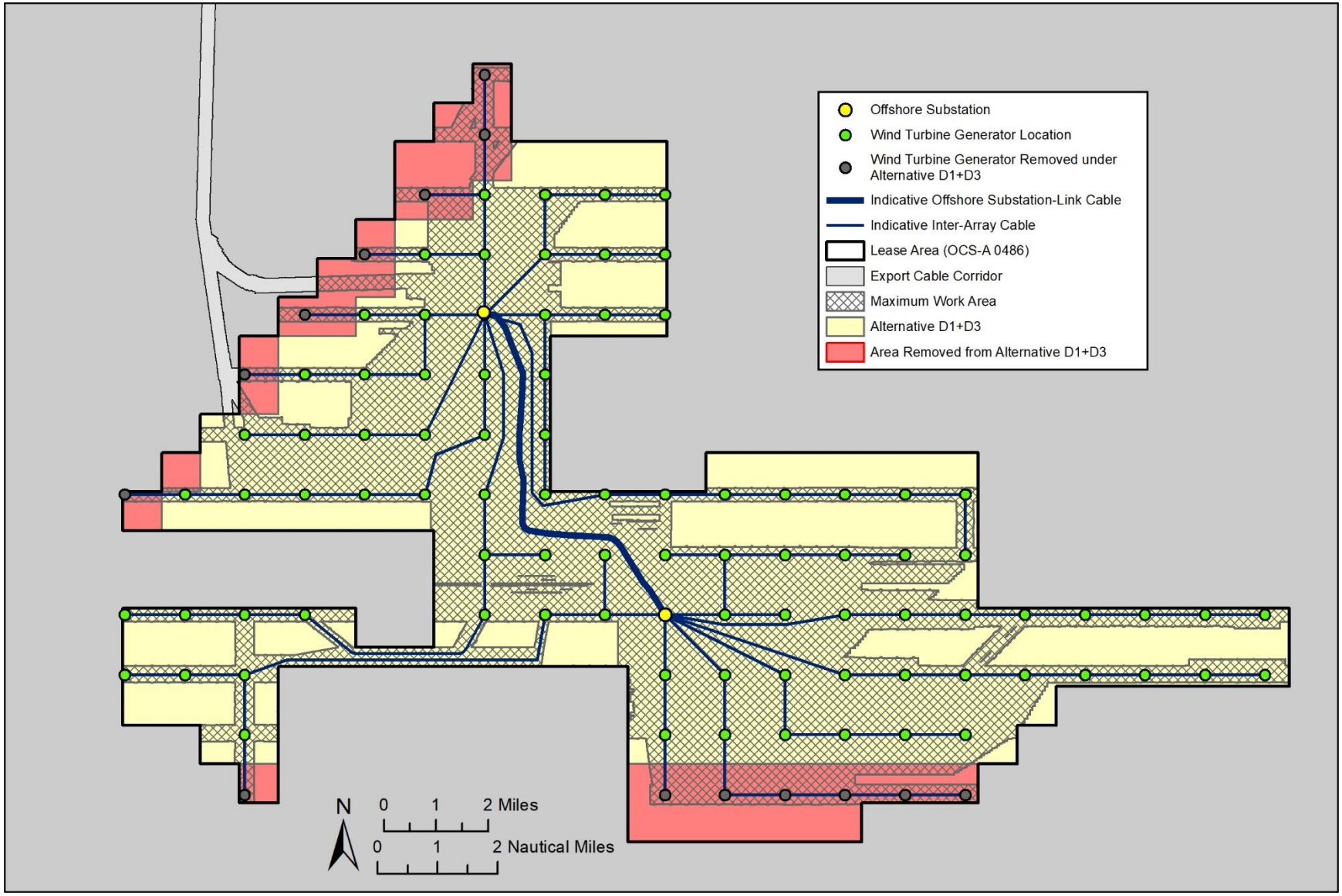


Figure 2.1-14. Project location and components under the Transit Alternative D1+D3.

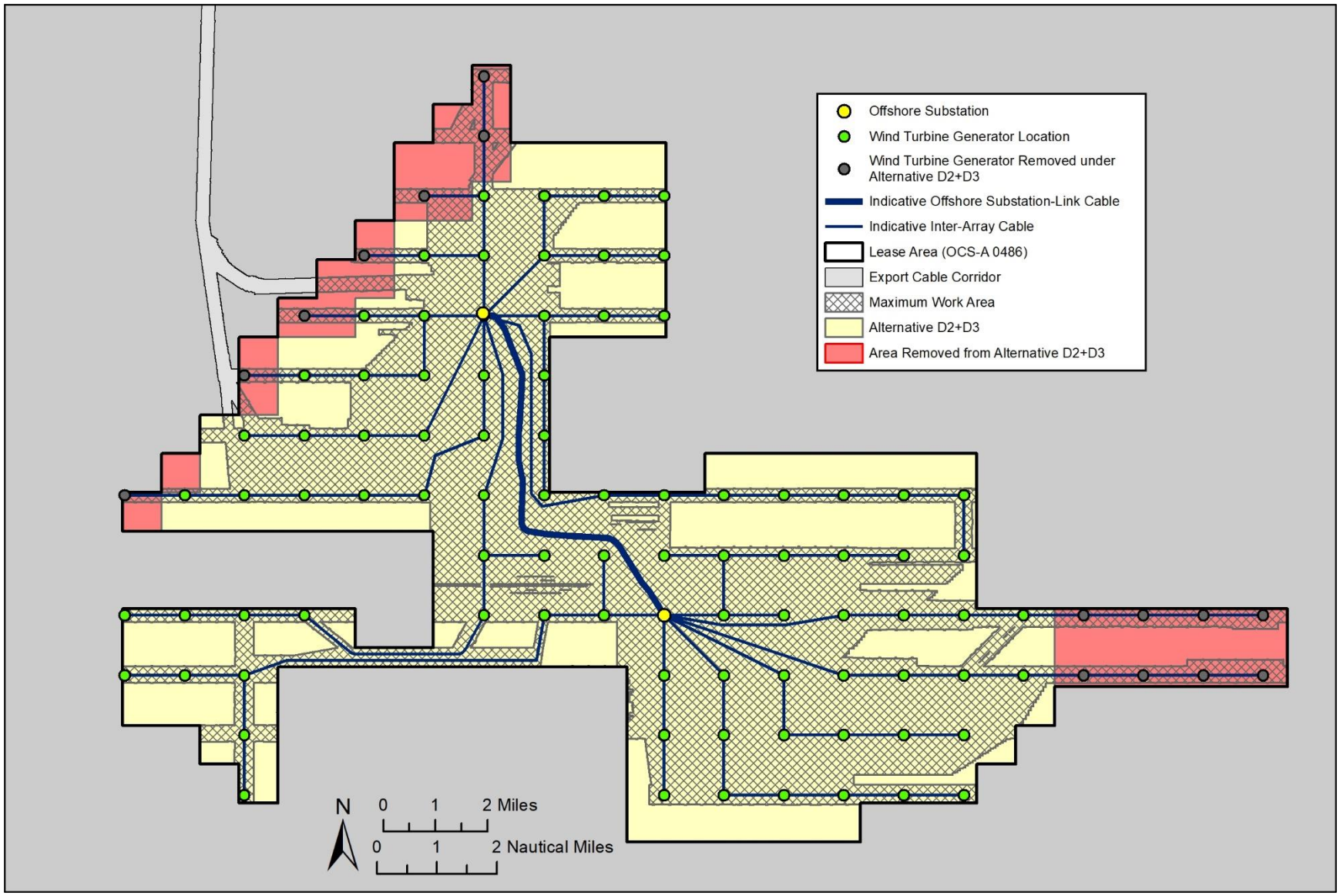


Figure 2.1-15. Project location and components under the Transit Alternative D2+D3.

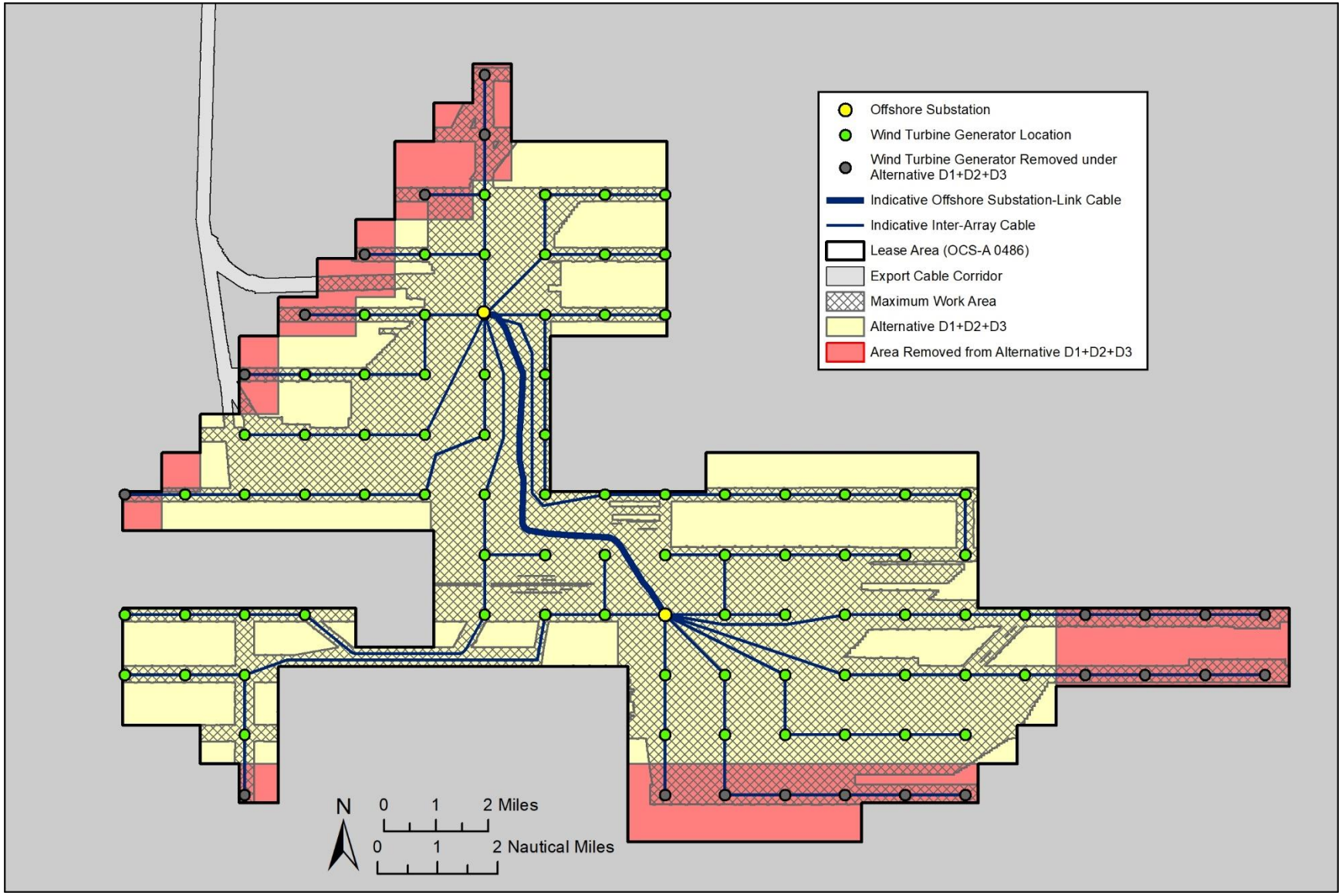


Figure 2.1-16. Project location and components under the Transit Alternative D1+D2+D3.

2.1.5 Alternative E: Viewshed Alternative

Alternative E (Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative), hereafter referred to as the Viewshed Alternative, would comprise the construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the RWF COP (vhb 2022). However, to reduce the visual impacts on culturally important resources on Martha's Vineyard (and likely several other National Historic Landmarks (NHLs) in Rhode Island and Massachusetts), some WTGs would be eliminated while maintaining the uniform east–west and north–south 1 × 1–nm grid spacing between WTGs (Figures 2.1-17 and 2.1-18). Under this alternative, fewer WTG locations (and probably fewer miles of IACs) than proposed by the lessee would be approved by BOEM. Under this alternative, BOEM could select one of the alternatives in Table 2.1-16.

Table 2.1-16. Alternative E Alternatives

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

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

BOEM considered seven alternatives for Alternative E before selecting Alternatives E1 and E2, which are illustrated in Figures 2.1-17 and 2.1-18. Appendix K provides additional rationale on the evolution of Alternative E1 and E2.

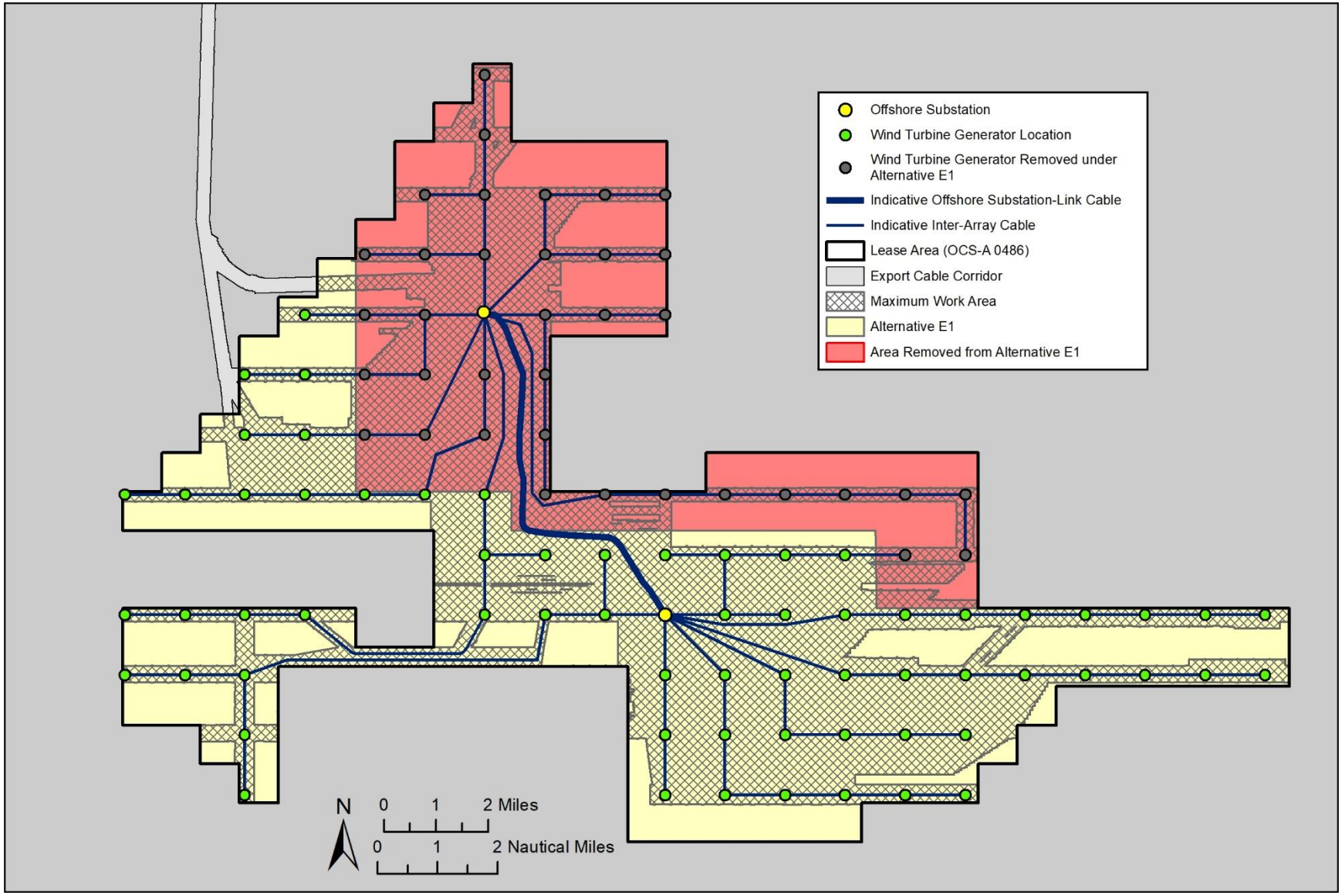


Figure 2.1-17. Project location and components under the Viewshed Alternative E1.

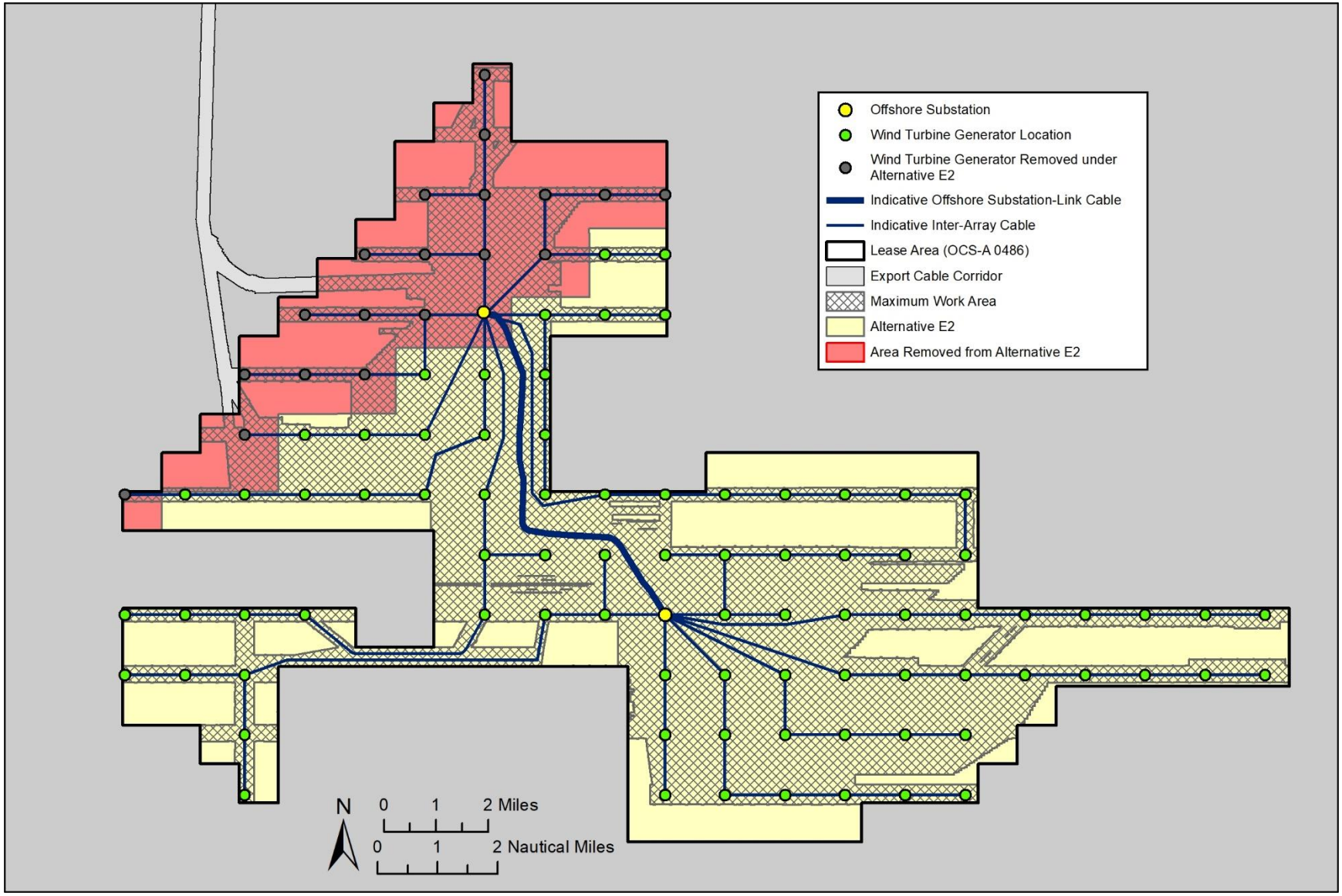


Figure 2.1-18. Project location and components under the Viewshed Alternative E2.

2.1.6 Alternative F: Higher Capacity Turbine Alternative

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

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

2.1.7 Alternatives Considered But Dismissed from Detailed Analysis

BOEM considered a range of alternatives during the EIS development process that emerged from scoping, interagency coordination, government-to-government consultation, and internal BOEM deliberations. To be carried forward for analysis, all considered alternatives were required to meet the following screening criteria: 1) meet the purpose of and need for the Proposed Action; 2) be operationally, technically, and economically feasible and implementable; 3) be consistent with other local, state, or federal plans, permits, and regulations; 4) further reduce or avoid impacts as compared to the Proposed Action; and 5) not be substantially the same as another alternative. Table 2.1-17 summarizes the alternatives considered but dismissed from detailed analysis along with rationale for elimination.

Table 2.1-17. Alternatives Considered but Dismissed from Detailed Analysis

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

Alternative	Rationale for Dismissal
Fisheries Habitat Impact Minimization Alternative (Habitat Alternative), including micrositing and reduction of the total number of foundations installed in the Lease Area as well as micrositing and reduction of the linear feet of cabling in the Lease Area. This alternative would be supported by location-specific benthic and habitat characterizations, with discussion of the most and least impacted areas within the Lease Area for placement of Project components, and would require preconstruction survey work.	Functionally equivalent to the Habitat Alternative; proposed for detailed analysis.
Fisheries Habitat Impact Minimization Alternative for the export cable route. This alternative would be the construction, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures described in the COP, as referenced in Alternative B (the Proposed Action). However, to reduce impacts to complex fisheries habitats as compared to the Proposed Action, BOEM would require Orsted to consider routing the export cable to avoid complex habitats and maximize cable burial along the cable route.	As summarized in Section 2.1.2 of the COP, Revolution Wind conducted comprehensive desktop studies of oceanographic, geologic, shallow hazards, archaeological, and environmental resources in the Lease Area beginning in 2017 (vhb 2022). These desktop studies informed the preliminary siting of the Project and supported the development of COP survey plans, which were conducted in 2017, 2018, and 2019. The purpose of the COP surveys was to conduct site characterization, marine archeological, and benthic studies necessary to further evaluate the seafloor in the Lease Area and along potential RWEC routes. The COP survey plans were submitted in accordance with the stipulations of the Lease as well as the following BOEM regulations and BOEM's guidelines: *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR 585*, dated May 27, 2020 (BOEM 2020a) *Guidelines for Submission of Spatial Data for Atlantic Offshore Renewable Energy Development Site Characterization Surveys*, dated February 1, 2013 (BOEM 2013) *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR 585*, dated May 27, 2020 (BOEM 2020b) *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585*, dated June 2019 (BOEM 2019) *Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP)*, dated May 27, 2020 (Version 4.0) (BOEM 2020c) Between the Lease Area and shore, Revolution Wind reviewed available data potentially affecting route suitability, such as seafloor slope, geological

Alternative	Rationale for Dismissal
	hazards, tidal currents, submarine utilities, dumping grounds, shipwrecks and other seafloor obstructions, unexploded ordnances, munitions and explosives of concern, existing cable crossings, anchorage/mooring areas, pilot boarding zones, navigational safety zones, and U.S. Department of Defense military practice areas. Through the extensive survey work conducted as part of the site assessment phase, BOEM and the operator did not identify cable route alternatives during Project development that would further reduce or avoid benthic impacts (see Section 2.2.1 of the COP). Significant changes to the proposed export corridor would likely result in substantial cost for the applicant, could be counter to BOEM policy objectives of responsible and orderly development of the OCS under the OCSLA, and have not been determined as necessary based on stakeholder feedback provided to date. In addition, a site-specific cable burial risk assessment would be completed with additional approvals conducted at the facility design report/facility installation report stage prior to installation of any cables. No alternative cable route(s) have been proposed that are meaningfully different from those already evaluated, which also include supporting evidence of significantly reducing impacts when compared to the Proposed Action or that address impacts that could not be addressed in the site-specific cable burial risk assessment.
Alternative that uses common cable routing corridors with adjacent projects to facilitate avoidance and minimization of impacts to resources by reducing the number of corridors and allowing for programmatic-level review and comment.	The cable route for a project is primarily governed by where the energy needs to be delivered. For a corridor to be even possible, different projects would need to deliver the energy to areas that, at a minimum, are located in the general direction of where all the projects in the corridor need to deliver the power. The Project intends to deliver power to the existing Davisville Substation in North Kingstown, Rhode Island, and none of the projects for which COPs are under consideration intend to deliver power to areas that will have cables located in that general location. Therefore, it is impossible to analyze any reasonable cable routing corridor for the Project. Further, cable route planning for the Project is complex, and there is limited flexibility to accommodate major changes. In general, granting overlapping easements could unreasonably interfere with the rights of the lessee with the existing project easement or be inconsistent with the purpose for granting that existing easement.

Alternative	Rationale for Dismissal
	The Bureau of Safety and Environmental Enforcement (BSEE) TAP-722 *Offshore Wind Submarine Cable Spacing Guidance* (Bureau of Safety and Environmental Enforcement 2014) notes that circumstances vary considerably locally and that spacing between cables should be considered on a case-by-case basis and incorporate all relevant information (e.g., shipping and fishing data, ground conditions, installation and repair techniques) and taking into account site- and route-specific risk assessment. Establishing shared export cable routes does not fully allow the incorporation of local, specific, and nuanced information for individual projects, and making this type of programmatic decision is outside the scope of this EIS. This alternative could limit the flexibility of both the developer and regulatory authorities for this and adjacent projects. For example: • There are significant safety and technological concerns around cable maintenance and repair. Developers generally require a corridor whose width is two to four times the depth of the water column to allow sufficient space for repairs. • Developers strive for the least amount of cable to minimize installation cost and time, seafloor disturbance, and transmission loss; therefore, a shift in plans could not be cost effective for the applicant and could be counter to BOEM policy objectives of responsible and orderly development of the OCS under OCSLA. • Increased Project cost and technical difficulties. Cable spacing needs to consider ongoing access to structures for O&M. • Installation, repair, and maintenance are expected to occur at different times for adjacent projects, requiring infrastructure already in place to be disturbed when it otherwise would not be, which adds an additional element of risk. As explained above, the export corridors for currently proposed Rhode Island and Massachusetts wind facilities offer little to no opportunity for alignment, and implementation would be impossible.

Alternative	Rationale for Dismissal
Alternative to require developers to be responsible for removing offshore wind equipment if and when their project ends and further require offshore wind developers and operators to place adequate resources in trust to ensure that decommissioning would occur regardless of bankruptcy, change of ownership, or lack of profitability.	BOEM regulations (30 CFR 585, Subpart I) currently require the removal of the cables by lessees. BOEM also has policies in place to ensure that the government will not incur decommissioning expenses due to company bankruptcy (30 CFR 585.515-585.537).
Transit Lane Alternative with lanes at least 4 nm wide, where no surface occupancy would occur.	Aspects of this proposed alternative were incorporated into the Transit Alternative which analyzes setbacks from the Buzzard's Bay Traffic Separation Scheme Inbound Lane and removes overlap with the proposed RODA lanes in which no surface occupancy would be allowed . The WTGs removed in the Habitat Alternative could also contribute to enhanced navigation in the Lease Area equivalent to a 4-nm-wide buffer lane with no surface occupancy. Furthermore, no additional setbacks regarding navigation concerns were identified beyond those under consideration in the Transit Alternative. The commercial fishing industry has generally approached the issue of vessel transit in the southern New England lease areas holistically rather than prioritizing one route over another. In fact, RODA's February 22, 2019, comment letter on the Vineyard Wind 1 Draft EIS stated that there was "no broad 'consensus' on the location nor position of reasonable transit routes throughout the large complex of New England WEAs" (RODA 2019). Each of the proposed transit lanes reflects priorities of different ports and different fisheries. In November 2019, the Northeast leaseholders' agreement was reached to align project layouts and avoid irregular transit corridors (Geijerstam et al. 2019). Adding transit corridors could erode project economics and logistics and potentially lead the lessee to retract from the agreement, which it committed to assuming that no additional transit lanes would be required. The 1 × 1–nm standard and uniform grid pattern with at least three lines of orientation and standard spacing to accommodate vessel transits, traditional fishing operations, and SAR operations, throughout the MA/RI WEA was informed by the Massachusetts and Rhode Island Port Access Route Study.
Alternative related to location, burial depth, and spacing of export cables and IACs to minimize environmental or fishing operations and transit impacts, with the depth of burial deeper than 4 to 6 feet.	Substantially similar in design and encompassed within the Habitat Alternative.

Alternative	Rationale for Dismissal
	The target burial depth in specific areas along the cable routes will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a required Cable Burial Risk Assessment (CBRA). The burial depth requirement would be evaluated and applied to any action alternative, and BOEM can develop and apply any appropriate mitigation measures as a result. If adequate avoidance could not be achieved through mitigation, then BOEM could require an update to the COP that could require additional NEPA review and, if warranted, could lead to selection of the No Action Alternative. The rationale for dismissal of the Fisheries Habitat Impact Minimization Alternative for the export cable route listed above in this table is also incorporated by reference here.
Alternative related to location and spacing of WTGs within the Lease Area to minimize environmental or fishing operations and transit impacts, with spacing farther apart than 1 × 1 nm.	Substantially similar in design and encompassed within the Habitat Alternative and the Transit Alternative. Furthermore, no additional lanes were identified beyond those under consideration in the Transit Alternative that would constitute wider spacing nor did any feedback from the USCG indicate a need for additional lanes based on the volume and types of vessels anticipated to be transiting within the wind farm area. The 1 × 1–nm grid is supported by the MARIPAS and maximizes safety and navigation consistency. The USCG also asserted that 1 × 1–nm grid spacing provides ample maneuvering space for typical fishing vessels expected in the project area. The final Massachusetts and Rhode Island Port Access Route Study did not recommend implementation of a wider transit lane. Also, analysis of AIS data indicates that 1 × 1–nm grid spacing between WTGs is sufficient for fishing vessels to turn and navigate within the proposed WEA, and no other available information indicates that increased spacing between WTGs would enhance maneuverability of vessels fishing within the WEA. All Rhode Island and Massachusetts offshore wind leaseholders have committed to implementing a 1 × 1–nm WTG grid layout in east–west orientation in response to stakeholder feedback. The Rhode Island and Massachusetts Lease Area developers' agreement was reached in order to avoid irregular transit corridors. Deviation from the 1 × 1–nm grid agreed to by developers would need to be considered for the entire WEA and not one to two projects. The adjoining lease areas must have the same grid throughout or at least a buffer area across borders to allow for safe

Alternative	Rationale for Dismissal
	navigation. Wider spacing (unless it was on axis 2 × 2 nm, which would not meet the purpose and need) would mean mismatched layouts between RWF and leases farther south and east. Increasing spacing would directly affect the size of generators needed. The Navigation Safety Risk Assessment (DNV GL Energy USA, Inc. 2020) modeled 144 structures at a minimum of 0.6 nm apart and each 10 m in diameter (i.e., very conservative). The modeling found very minimal risks from the Project as proposed. Additional buffers or corridors beyond what was analyzed in the Navigation Safety Risk Assessment was not deemed warranted.
Alternative that combines the most disruptive components for each option included in the PDE.	This proposed alternative is considered under the Proposed Action as BOEM's analysis focuses on the most impactful parameters or combination of parameters by resource area.
Alternative that includes infrastructure design technologies that differ from those proposed in the COP that may pose lesser impacts on sensitive environmental resources.	The COP (Section 2.2) thoroughly analyzes different design parameters and technologies and includes rationale for what is proposed in the PDE and why parameters outside the PDE were eliminated. This submitted alternative lacks specificity for BOEM to meaningfully analyze it in detail. The EIS will consider various methods as part of the PDE for all alternatives, and hence this separate proposed alternative is unnecessary for ensuring their consideration.
Alternatives to avoid development of offshore wind in 1) Seasonal Management Areas; and 2) areas where persistent or long-duration Dynamic Management Areas are established and extended for more than 3 months in any 1 year of the most recent 5 years.	To be considered as proposed mitigation.

2.2 Non-Routine Activities and Low-Probability Events

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

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

Activity or Event	Potential for Project Impacts
Corrective maintenance activities	These activities could be required as a result of other low-probability events or as a result of unanticipated equipment wear or malfunctions. Revolution Wind would stock spare parts and have sufficient workforce available to conduct corrective maintenance activities, if required.
Collisions and allisions	These activities could result in spills (described below) or injuries or fatalities to humans and/or wildlife (addressed in Chapter 3). Collisions and allisions would likely be minimized through the USCG's requirement for lighting on vessels, temporary safety zones anticipated to be implemented by Revolution Wind during construction, implementation of NOAA vessel-strike guidance, proposed spacing between WTGs and other facility components, and inclusion of Project components on nautical charts. See COP Appendix R for additional information.
Cable displacement or damage by vessel anchors or fishing gear	This could result in safety concerns and economic damages to vessel operators. However, such incidents would be minimized by the inclusion of Project components on nautical charts and the cable burial or other protection measures.
Chemical spills or releases	For offshore activities, these would include inadvertent releases from refueling vessels, spills from routine maintenance activities, and any significant spills as a result of other accidental events. Revolution Wind would comply with USCG and Bureau of Safety and Environmental Enforcement regulations relating to prevention and control of oil spills. Onshore, releases could occur from construction equipment and/or HDD activities. Revolution Wind would prepare a construction spill prevention, control, and countermeasures (SPCC) plan in accordance with applicable requirements and would outline spill prevention plans and measures to take to contain and clean up spills that could occur. See COP Appendix D for additional information.
Severe weather (e.g., hurricanes) and natural events	Revolution Wind designed the Project components to withstand severe weather events. However, severe flooding or coastal erosion could require repairs during construction and installation activities. Although highly unlikely, structural failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels.
Medical events	Illness or injury of construction or operation crew could result in emergency medical services requiring vessel or aircraft/helicopter trips. However, Revolution Wind would comply with all local emergency management plans and coordinate with local emergency officials to minimize risks associated with medical events.
Terrorist attacks	Impacts from terrorist attacks (including cyber attacks) could vary greatly in magnitude and extent and therefore their analysis would be highly speculative. BOEM also considers terrorist attacks unlikely, and therefore, does not analyze them further in the EIS.

2.3 Summary and Comparison of Impacts by Alternative

2.3.1 Comparison of Impacts by Alternative

Table 2.3-1 summarizes incremental and overall cumulative impacts by environmental resource and alternative. Green cell color represents negligible to minor adverse overall impact. Yellow cell color represents moderate adverse overall impact. Orange cell color represents major adverse overall impact. Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by hatched cells and an asterisk. More detailed comparisons of impacts by environmental resource and alternative, to include incremental impacts between alternatives, are provided in Chapter 3.

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

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Air quality*	Continuation of current air quality trends and sources of air pollution. The overall cumulative impact to air quality would be **minor** to **moderate** adverse and **minor** to **moderate** beneficial.*	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.	This alternative's incremental impact to air quality would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to air quality would be **moderate** adverse.
Bats	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. he overall cumulative impact to bats would be **negligible** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.	This alternative's incremental impact to bats would be **negligible** to **minor** adverse. The overall cumulative impact to bats would be **minor** adverse.
Benthic habitat and invertebrates*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to benthic habitat and invertebrates would be **minor** to **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to benthic habitat and invertebrates would be **moderate** adverse and **moderate** beneficial.*
Birds	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.	This alternative's incremental impact to birds would be **minor** adverse. The overall cumulative impact to birds would be **minor** adverse.
Coastal habitats and fauna	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to coastal habitats and fauna would be **negligible** to **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.	This alternative's incremental impact to coastal habitats and fauna would be **negligible** to **minor** adverse. The overall cumulative impact to coastal habitats and fauna would be **minor** adverse.
Commercial fisheries and for-hire recreational fishing*	Continuation of current trends. The overall cumulative impact would be **moderate** to **major** adverse for commercial fisheries and **minor** to **moderate** adverse and **minor** beneficial for for-hire recreational fishing.*	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.	This alternative's incremental impact to commercial fisheries and for-hire recreational fishing would be **negligible** to **major** adverse and **minor** beneficial.* The overall cumulative impact to commercial fisheries and for-hire recreational fishing would be **major** adverse.

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Cultural resources	Continuation of individual IPF impacts to cultural resources from past and current activities. The overall cumulative impact to cultural resources would be **negligible** to **major** negative†.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.	This alternative's incremental impact to cultural resources would be **negligible** to **major** negative†. The overall cumulative impact to cultural resources would be **negligible** to **major** negative.
Demographics, employment, and economics*	Continuation of current trends. The overall cumulative impact to demographics, employment, and economics would be **moderate** to **major** adverse and **minor** to **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*	This alternative's incremental impact to demographics, employment, and economics would be **minor** beneficial.* The overall cumulative impact to demographics, employment, and economics would be **major** adverse and **moderate** beneficial.*
Environmental justice*	Continuation of current trends. The overall cumulative impact to environmental justice communities would be **major** adverse and **negligible** to **moderate** beneficial.*	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.	This alternative's incremental impact to environmental justice communities would be **minor** to **moderate** adverse and **minor** beneficial.* The overall cumulative impact to environmental justice communities would be **major** adverse.
Finfish and essential fish habitat*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*	This alternative's incremental impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.* The overall cumulative impact to finfish and essential fish habitat would be **moderate** adverse and **moderate** beneficial.*
Land use and coastal infrastructure*	Continuation of current trends. The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.	This alternative's incremental impact to land use and coastal infrastructure would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to land use and coastal infrastructure would be **minor** adverse.
Marine mammals*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to marine mammals would be **moderate** adverse and **minor** beneficial.*	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.	This alternative's incremental impact to marine mammals would be **moderate** adverse. The overall cumulative impact to marine mammals would be **moderate** adverse.

Resource	Alternative A (No Action Alternative)	Alternative B (Proposed Action)	Alternative C (Habitat Alternative)	Alternative D (Transit Alternative)	Alternative E (Viewshed Alternative)	Alternative F (Higher Capacity Turbine Alternative)
Navigation and vessel traffic	Continuation of current trends. The overall cumulative impact to navigation and vessel traffic would be **minor** to **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.	This alternative's incremental impact to navigation and vessel traffic would be **moderate** adverse. The overall cumulative impact to navigation and vessel traffic would be **moderate** adverse.
Other uses: aviation and air traffic	Continuation of current trends. The overall cumulative impact to other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.	This alternative's incremental impact to other aviation and air traffic uses would be **negligible** adverse. The overall cumulative impact other aviation and air traffic uses would be **minor** adverse.
Other uses: land-based radar	Continuation of current trends. The overall cumulative impact to other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.	This alternative's incremental impact to other land-based radar uses would be **minor** adverse. The overall cumulative impact other land-based radar uses would be **moderate** adverse.
Other uses: military and national security	Continuation of current trends. The overall cumulative impact to other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.	This alternative's incremental impact to other military and national security uses would be **minor** adverse. The overall cumulative impact other military and national security uses would be **moderate** adverse.
Other uses: scientific research and surveys	Continuation of current trends. The overall cumulative impact to other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.	This alternative's incremental impact to other scientific research and surveys uses would be **major** adverse. The overall cumulative impact other scientific research and surveys uses would be **major** adverse.
Other uses: undersea cables	Continuation of current trends. The overall cumulative impact to other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.	This alternative's incremental impact to other undersea cables uses would be **negligible** adverse. The overall cumulative impact other undersea cables uses would be **negligible** adverse.

Resource	**Alternative A (No Action Alternative)**	**Alternative B (Proposed Action)**	**Alternative C (Habitat Alternative)**	**Alternative D (Transit Alternative)**	**Alternative E (Viewshed Alternative)**	**Alternative F (Higher Capacity Turbine Alternative)**
Recreation and tourism	Continuation of current trends. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.	This alternative's incremental impact to recreation and tourism would be **minor** adverse. The overall cumulative impact to recreation and tourism would be **minor** adverse.
Sea turtles*	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. The overall cumulative impact to sea turtles would be **minor** adverse and **minor** beneficial.*	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.	This alternative's incremental impact to sea turtles would be **minor** adverse and **minor** beneficial.* The overall cumulative impact to sea turtles would be **minor** adverse.
Visual resources	Continuation of impacts to viewshed from past and current activities. The overall cumulative impact to visual resources would be **moderate** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.	This alternative's incremental impact to visual resources would be **moderate** to **major** adverse. The overall cumulative impact to visual resources would be **negligible** to **major** adverse.
Water quality	Continuation of current water quality trends and sources of pollution. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact water quality would be **minor** adverse.	This alternative's incremental impact to water quality would be **minor** adverse. The overall cumulative impact to water quality would be **minor** adverse.
Wetlands and other waters of the United States	Continuation of current wetland resources trends and sources of pollution. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.	This alternative's incremental impact to wetland resources would be **negligible** to **minor** adverse. The overall cumulative impact to wetland resources would be **minor** adverse.

* Resources with beneficial impacts are denoted by an asterisk, and alternatives within those resource rows with beneficial impacts are denoted by hatched cells and an asterisk.

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

3 Affected Environment and Environmental Consequences

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

Where adverse or beneficial is not specifically noted, the reader should assume the impact is adverse.[11] These overall determinations consider the combined effects of the individual impact level for each impact-producing factor (IPF) for each resource, as addressed in Section 3.1. Where information is incomplete or unavailable for the evaluation of reasonably foreseeable impacts analyzed in this chapter, BOEM identified and conducted its analysis in accordance with Section 1502.21 of the CEQ regulations in Appendix C (Analysis of Incomplete or Unavailable Information).

3.1 Impact-Producing Factors

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

A resource's geographic analysis area (GAA) is defined by the IPF with the maximum geographic area of impact. The purpose of using these GAAs is to capture the impacts from planned activities to each of those resources potentially impacted by the Proposed Action. The GAA for each resource area is defined in the resource area sections of the EIS. GAAs are further discussed in Appendix E and complex GAAs are defined in Appendix G.

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

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

3.2 Mitigation Identified for Analysis in the Environmental Impact Statement

Mitigation and monitoring measures identified for analysis in the EIS are summarized at the end of each resource area in this chapter (Sections 3.4–3.22) and are identified in Appendix F (Environmental Protection Measures and Mitigation and Monitoring). The EPMs (Table F-1) are those measures Revolution Wind has committed to executing in the COP and are therefore analyzed in the EIS as components of the Project design. Additional mitigation measures identified by BOEM, as well as those that may result from reviews under other statutes, are shown in Table F-2. Each resource area discusses how and to what degree the additional mitigation measures could reduce impacts. Please note that not all of these mitigation measures are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities. If BOEM decides to approve the COP, its ROD would state which of the mitigation and monitoring measures identified by BOEM in Table F-2 have been adopted, and if not, why.

3.3 Definition of Impact Levels

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

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

Table 3.3-1. Resources Potentially Affected by the Project

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

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Table 3.3-2. Definitions of Potential Adverse Impact Levels

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

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Table 3.3-3. Definitions of Potential Beneficial Impact Levels

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

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

With regard to temporal extent, construction effects generally diminish once construction ends; however, ongoing O&M activities could result in additional impacts for the potential 35-year life of the Project. Additionally, Revolution Wind would have up to an additional 2 years to complete decommissioning activities. Therefore, the EIS considers the time frame beginning with construction and ending when the Project's decommissioning is complete, unless otherwise noted. Table 3.3-4 provides the duration terms used in the EIS.[12]

Table 3.3-4. Definitions of Duration Terms

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

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

Table 3.3-5. Definitions of Incremental Impact Terms

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

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

3.4 Air Quality

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

3.5 Bats

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

3.6 Benthic Habitat and Invertebrates

3.6.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Benthic Habitat and Invertebrates

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

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

3.6.1.1 Benthic Habitat

Geographic analysis area: The GAA for benthic habitat comprises the maximum work area; selected control and reference areas for monitoring activities under the Project fisheries research and monitoring plan (FRMP) (Revolution Wind and Inspire Environmental 2021); 5,650-foot and 6,550-foot buffers on either side of the RWEC in federal and state waters, respectively; and a 1,500-foot buffer on either side of the IAC corridor over the entirety of its length, including the foundation and scour protection footprints; and a 1,500-foot buffer around the OSS-link cables over the entirety of their lengths. These areas are shown in Figure 3.6-1. FRMP survey activities will be randomly distributed within their associated control and reference areas. As such, those areas do not represent an anticipated impact footprint; rather, they represent the broader area in which limited effects will occur. The RWEF, IAC, and OSS-link impact buffers represent the maximum extent of measurable impacts on benthic habitat composition resulting from Project construction and operations. The associated IPFs include bottom-disturbing activities such as anchoring, seafloor preparation, cable and foundation installation, and placement of cable and scour protection that would lead to localized changes in the composition and three-dimensional structure of seafloor sediments. This includes areas affected by the deposition of suspended sediments from construction-related seafloor disturbance resulting from deposition of suspended sediments disturbed during construction exceeding 0.003 inch (0.1 millimeter [mm]) in depth. They also include operational effects from the presence of structures that would lead over time to changes in seafloor composition, specifically the composition and three-dimensional structure of sediment types around WTG and OSS

foundations resulting from reef effects. The encompassed area shown on Figure 3.6-1 that lies between the FRMP monitoring sites and the impact buffers within the RWF and RWEC are outside the likely extent of impacts to benthic habitat composition and are not included in the GAA. The GAA has been defined to reflect the limited extent of impacts from Project activities on the structure and composition of the seafloor. This definition was selected because the GAA captures the extent of benthic habitat occurring within the footprint of Project activities because the seafloor sediments that comprise benthic habitats do not move or migrate at regional scales like other biological resources. This area also accounts for some transport of water masses, sediment transport, and benthic invertebrate larval transport due to ocean currents.

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

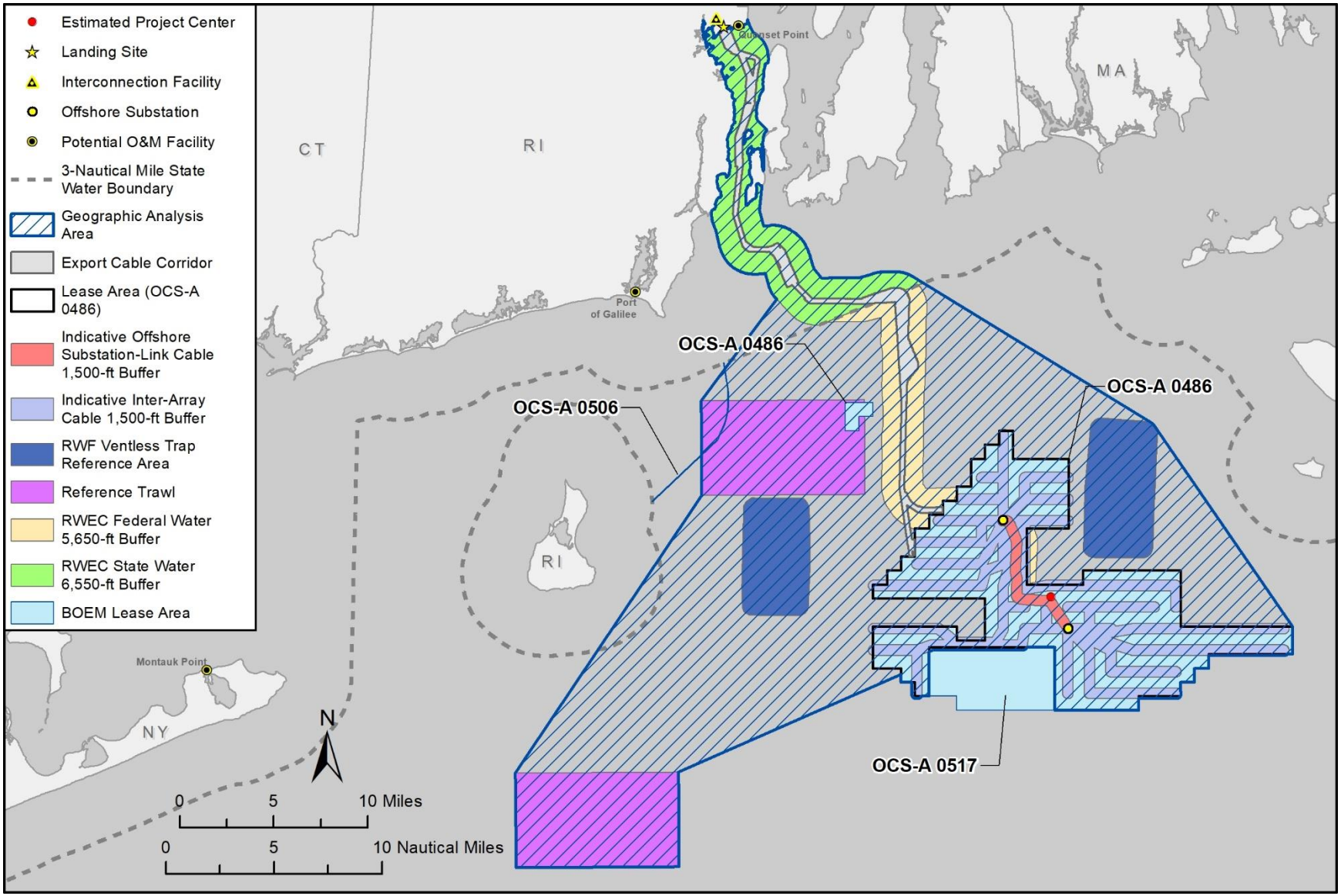

Figure 3.6-1. Geographic analysis area for benthic habitat.

Affected environment: The Mid-Atlantic Regional Council on the Ocean (MARCO) (2019), BOEM (Guida et al. 2017), and Revolution Wind (Fugro 2020) conducted large-scale general benthic habitat mapping within the RWF and along the RWEC corridor. Inspire Environmental (2021) characterized site-specific benthic habitat conditions by combining photographic surveys with side-scan sonar and backscatter data collected by Fugro (2020) to support the essential fish habitat (EFH) analysis. Inspire Environmental (2020a, 2021) has characterized substrate composition using the Coastal and Marine Ecological Classification Standard (CMECS) (Federal Geographic Data Committee [FGDC] 2012) and mapped benthic habitat to support analysis of impacts on living marine resources following NMFS (2021a).

For the purposes of analysis, four substrate classes are consolidated into three habitat groups: 1) large-grained complex habitat, 2) complex habitat, and 3) soft-bottom habitat. These groups were based on substrate size and composition and on their use by marine organisms. Large-grained complex habitat is composed primarily of hard surfaces in the form of large boulders and bedrock. Complex habitat comprises a diversity of habitat types, including small boulders; cobbles and coarse gravel; shell hash; substrate matrices composed predominantly of boulders, cobbles, and pebbles mixed with patches of finer material (e.g., pebbles in a sand matrix); and/or submerged aquatic vegetation. Complex habitats provide a mixture of hard surfaces and fine material that provide habitat for many different species. Invertebrate species that encrust or attach themselves to the hard surfaces provided by immobile boulders and cobbles are important components of complex benthic habitat. Soft-bottom benthic habitat is composed of silt, sand, sandy mud, mud, and muddy sand areas and does not include a substantial portion of coarse-grained sediment, although scattered patches of gravels and small cobbles may be present. The distribution of these habitat types within the RWF maximum work area and the RWEC installation corridor is displayed in Figures 3.6-2 and 3.6-3, respectively, and summarized in Table 3.6-1. The impacts of the Proposed Action and the other action alternatives would be contained entirely within the areas shown.

All seafloor sediments with the exception of bedrock and large boulders are mobile to varying degrees and are continually reshaped by bottom currents (Butman and Moody 1983; Daylander et al. 2012) and biological activity. These processes form features like sandwaves, ripples, and depressions that are used by many different fish species (Langton et al. 1995). For example, mobile waves in the substrate form natural depressions and can expose biological structures like amphipod tubes. These features provide cover for small fish and are components of designated EFH for some species, such as red and silver hake. BOEM (2020) defines ripples as sediment waves less than 1.6 feet high, mega-ripples are sediment waves between 1.6 and 4.9 feet high, and sandwaves are sediment waves greater than 4.9 feet high. These features are most prominent in soft-bottom habitat but can occur in any benthic habitat type (Inspire Environmental 2021).

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

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

3.6.1.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential benthic impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from the general guidelines in Section 3.3 using the following: short term (less than 2 years); long term (2 years to < life of the project); permanent (life of the project).[13] The impact definitions used are the same as described in Section 3.3. The analysis presented below comprises those IPFs associated with planned and future offshore wind energy development that are likely to result in greater than negligible effects on benthic habitat composition and structure. Those IPFs that are likely to result in negligible effects and impacts from other non–offshore wind–related activities are analyzed in Appendix E1, Table E2-3.

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

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

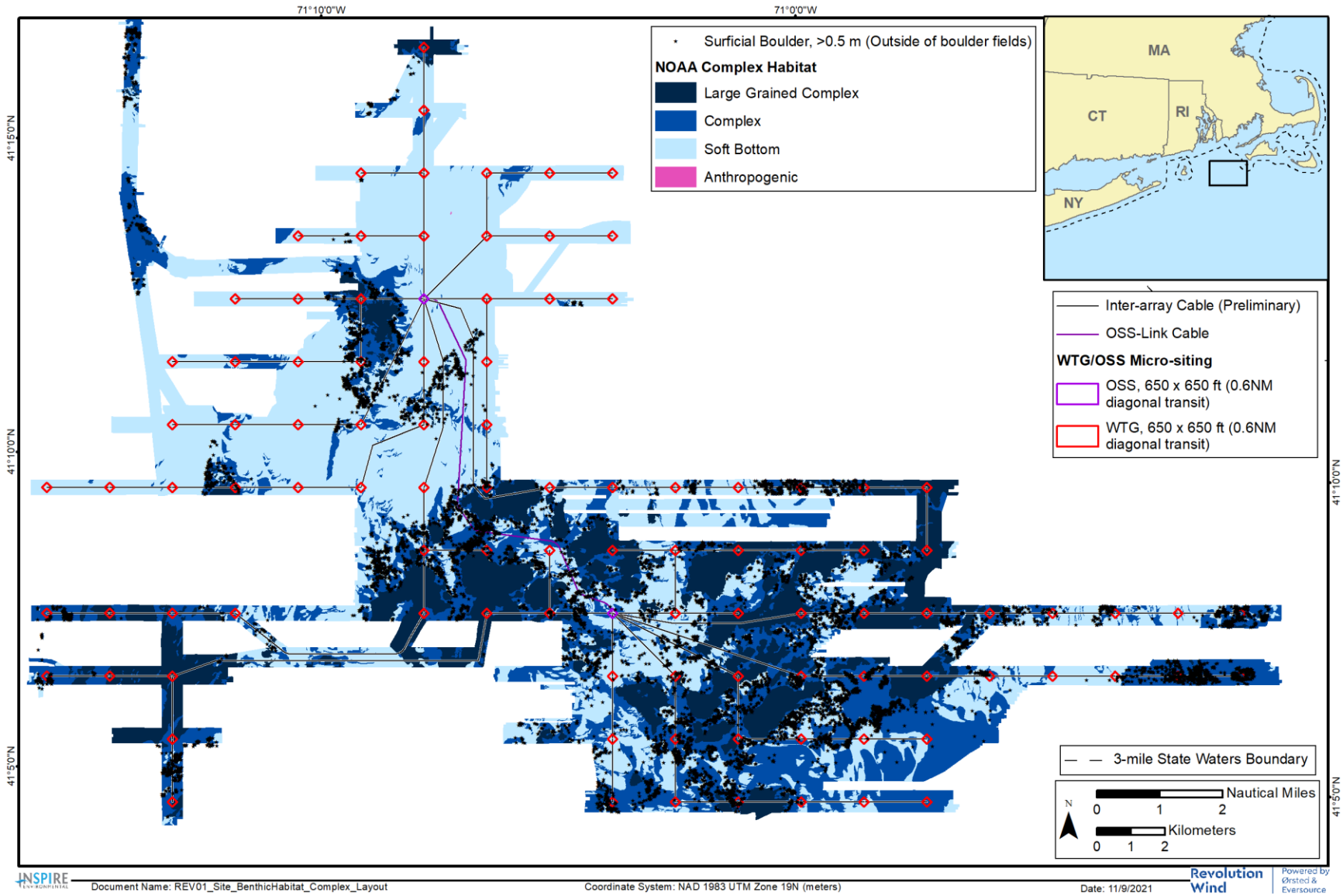

Figure 3.6-2. Distribution of large-grained complex, complex, and soft-bottom benthic habitat within the Revolution Wind Farm maximum work area and total acres by habitat type.

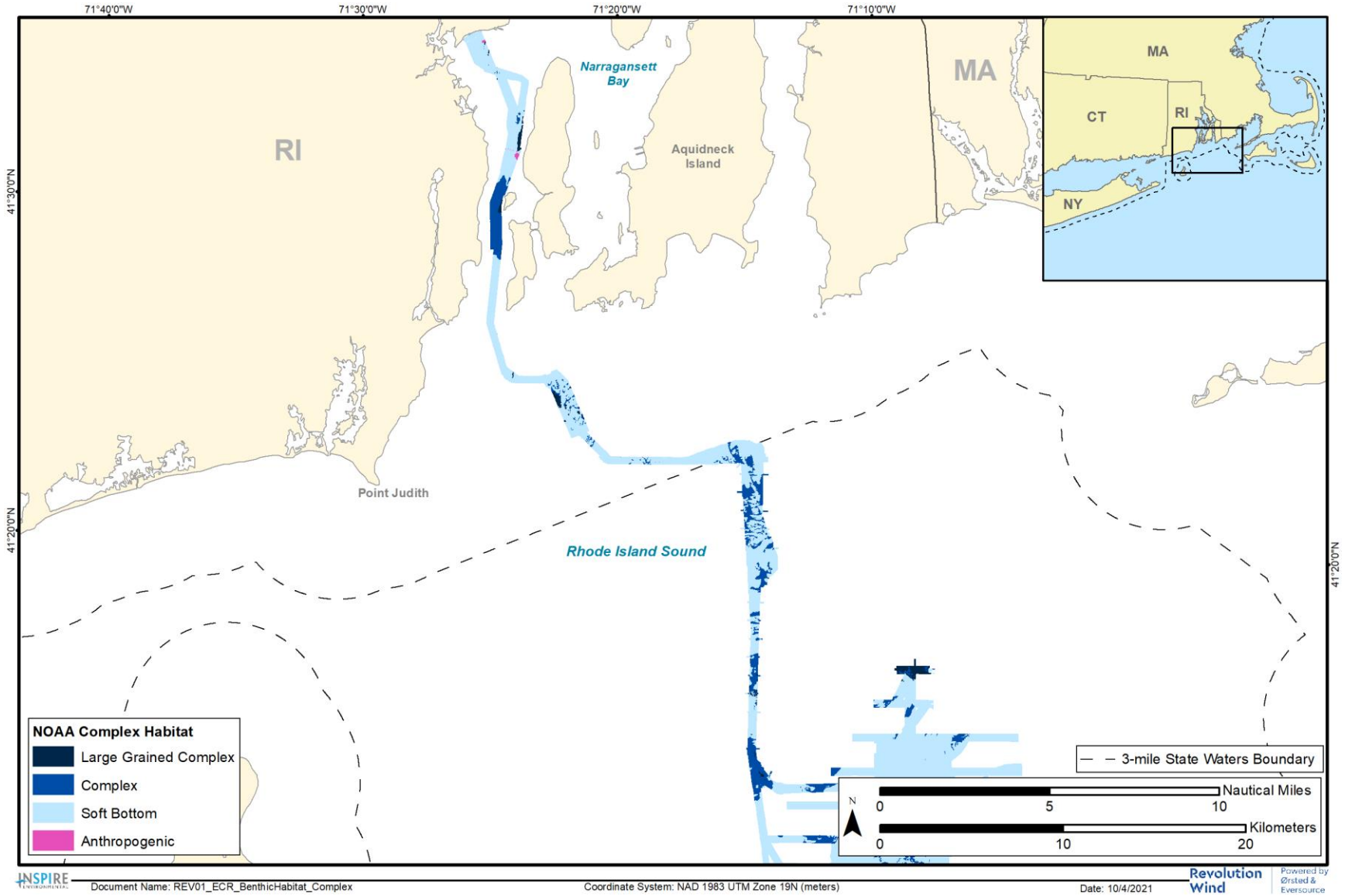

Figure 3.6-3. Distribution of large-grained complex, complex, and soft-bottom benthic habitat within the Revolution Wind Export Cable corridor and total acres by habitat type.

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Under the No Action Alternative, the Project would not be built and there would be no offshore wind–related anchoring or cable emplacement and maintenance activities within the GAA. No associated effects would occur in the GAA and therefore the impacts of this IPF would be **negligible** adverse.

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

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

3.6.1.1.2 Conclusions

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

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

impacts associated with ongoing activities in the GAA combined with reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** to **moderate** adverse impacts on benthic habitat.

3.6.1.2 Invertebrates

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

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

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

Squid, specifically longfin squid (*Doryteuthis pealeii*) and shortfin squid (*Illex illecebrosus*), are the pelagic invertebrate species likely to occur in the GAA during their juvenile and adult life stages (Cargnelli et al. 1999; Lowman et al. 2021). However, numerous benthic invertebrate species have pelagic eggs and larvae and rely on currents to disperse their offspring to new habitats (e.g., Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). These dispersed eggs and larvae are also a component of EFH as they form part of the prey base for a variety of species during one or more life stages.

Soft-sediment invertebrates create a permanent or semipermanent home in the bed sediments. Most of these invertebrates possess specialized organs for burrowing, digging, embedding, tube building, anchoring, or locomotion in soft substrates. Some species are capable of moving slowly over the bed surface on soft substrates, but these species are generally not able to travel across hard substrates for long periods. Soft-sediment invertebrates include various types of annelid worms (oligochaetes and polychaetes), flatworms (Platyhelminthes), and nematodes (Nematoda); crustaceans, such as burrowing

amphipods (Amphipoda), mysids (Mysida), copepods (Copepoda), and crabs (Brachyura); echinoderms, including sand dollars (Clypeasteroida), starfish (Asteroidea), and sea urchins (Echinoidea); and bivalve mollusks (Pelecypoda) (FGDC 2012; Inspire Environmental 2019; Stantec 2020). Economically important species, including Atlantic sea scallop (*Placopecten magellanicus*), bay scallop (*Argopecten irradians*), horseshoe crab (*Limulus polyphemus*), Atlantic surfclam (*Spisula solidissima*), squid, and ocean quahog (*Arctica islandica*), are associated with soft sediments on the mid-Atlantic OCS.

Invertebrates associated with hard substrates are found on the different types of complex habitat defined in Section 3.6.1.1 (i.e., large-grained complex and complex habitats). This group includes a diversity of species, such as members that firmly attach to hard surfaces or that crawl, rest, and/or cling to the surface of and/or shelter in the interstitial spaces between cobbles and boulders. Attached invertebrates use structures like pedal discs, cement, and byssal threads to attach to hard surfaces. Nonattached organisms use feet, claws, appendages, spines, suction, negative buoyancy, or other means to stay in contact with the hard substrate and may or may not be capable of slow movement over the surface. Examples of attached invertebrates include sea anemones, barnacles, corals, sponges, hydroids, bryozoans, mussels, and oysters. Examples of non-attached organisms include crabs, small shrimp, amphipods, starfish, and sea urchins (FGDC 2012; Inspire Environmental 2020a). Some economically important invertebrate species—notably, American lobster (*Homarus americanus*; also referred to as lobster)—are associated with hard substrates. Both soft-sediment and hard-surface invertebrate species are likely to be present within complex benthic habitat, with the former using patches of soft substrate commonly found in this habitat type. Soft-sediment invertebrates would be largely dominant in soft-bottom habitats, although some hard-surface species may occur on scattered hard surfaces where they are available.

Several commercially important invertebrate species, such as lobster, Atlantic sea scallop, longfin inshore squid and shortfin squid, and ocean quahog, occur within the RWF and RWEC portions of the GAA (Inspire Environmental 2020b). Squid eggs, most likely longfin squid, were observed at survey locations within the RWF footprint (Inspire Environmental 2020a), indicating that this species spawns in the vicinity. Squid attach their eggs to bottom substrates and use both complex and soft-bottom benthic habitats for spawning.

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

3.6.1.2.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential invertebrate impacts associated with future offshore wind development. The analysis presented below comprises those IPFs associated with planned and future offshore wind energy development that are likely to result in greater than negligible effects on benthic habitat composition and structure. Those IPFs that are likely to result in negligible effects are analyzed in

Appendix E, Table E2-3. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3 (see footnote in Section 3.6.1.1.1).

Offshore Activities and Facilities

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

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

Anchoring and new cable emplacement/maintenance: Up to 2,672 acres could be affected by anchoring/mooring activities during offshore wind energy development within the invertebrate GAA. As discussed under benthic habitat, this offshore energy facility construction would involve direct disturbance of the seafloor, leading to direct impacts on invertebrates, and these effects would be localized to the disturbance footprint and vicinity. The severity of these effects would vary depending on the species and life stage sensitivity to specific stressors that extend into the area, resulting in **minor** to **moderate** adverse impacts on invertebrates. Such impacts are expected to be localized and short term but could be long term in duration if they occur in eelgrass beds or permanent if they occur in hard-bottom habitats.

Future projects would also disturb up to 21,073 acres of seafloor from cable installation within the invertebrate GAA. The specific type and extent of habitat conversion and the resulting effects on invertebrates due to seafloor disturbance would vary depending on the project design and site-specific conditions. In addition, bottom-disturbing fishing activities, such as benthic trawl and scallop dredge fisheries, would continue to occur. These activities would result in short-term to long-term alterations of the seafloor. Invertebrates associated with soft-bottom habitat could be displaced if desired habitats, such as biogenic depressions, are altered, and the duration of displacement would vary depending on the nature of the effect. For example, seafloor preparation and cable installation would flatten sandwaves and eliminate or alter depressions in soft-bottom habitats. As stated in Section 3.6.1.1.1, those habitats would be expected to recover within 18 to 24 months as the seafloor is reshaped by natural sediment transport processes (Daylander et al. 2012) and seafloor-dwelling organisms recover following disturbance (HDR 2018). In contrast, relocation of boulders into soft-bottom habitat during seafloor preparation could permanently displace invertebrates within that footprint that rely on sand and mud substrates.

The development of future offshore wind energy facilities would create a distributed network of artificial reefs on the mid-Atlantic OCS. These reefs form biological hotspots that could support species range

shifts and expansions, the establishment of nonnative species, and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). Those changes could influence invertebrate community structure in the future, but the nature, extent, and biological significance of these potential changes are difficult to predict and a topic of ongoing research.

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

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

EMF: At least 10 submarine power and communications cables are present within or in the vicinity of the GAA for invertebrates. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables is not specified, the associated baseline EMF effects can be inferred from available literature. For example, electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 microvolts μV) per meter within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. EMF effects from submarine power cables would be similar in magnitude to those described for the Proposed Action but would vary depending on specific

transmission load. For example, the two power cables supplying Nantucket Island at a typical load of 46 kV and 420 amps (Balducci et al. 2019), are generally comparable to the 66-kV and 480-amp IAC cable.

Under the No Action Alternative, up to 10,024 miles of cable would be added in the invertebrate GAA, producing EMF effects in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use high-voltage alternating current (HVAC) transmission, but high-voltage direct current (HVDC) designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. EMF effects from these future projects on invertebrates would vary in extent and magnitude depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). The available research on EMF effects on invertebrates is contradictory, varying between studies and by type of transmission, making it difficult to draw definitive conclusions (Hutchison et al. 2020a, 2020b). However, HVAC transmission appears to be less likely to result in measurable physiological or behavioral effects (Hutchison et al. 2020b). Accordingly, long-term effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse for projects using HVAC transmission. Projects that use HVDC transmission could result in greater impacts. For example, Hutchison et al. (2018, 2020a) observed measurable behavioral responses in lobster (e.g., increased movement and changes in foraging patterns) exposed to EMF from an HVDC transmission cable. This suggests that HVDC transmission could influence invertebrate behavior over broader areas (i.e., along the length of the cable corridor), which could constitute a long-term **minor** or **moderate** adverse effect on invertebrates.

Light: Planned future activities include up to 3,008 offshore WTGs and OSS foundations in the GAA for invertebrates. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the forms of vessel lighting and navigation and safety lighting on offshore WTGs and OSS foundations.. Artificial light can attract mobile invertebrates and can influence biological functions (e.g., spawning) that are triggered by changes in daily and seasonal daylight cycles (Davies et al. 2015; McConnell et al. 2010). BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021; Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on invertebrates, fish and other aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. Given the minimal and localized nature of lighting effects anticipated under this guidance, the related effects from proposed future activities on invertebrates are likely to be **negligible** adverse.

Noise: Numerous proposed offshore wind construction projects could be developed on the mid-Atlantic OCS between 2022 to 2030 (see Appendix E). This would result in noise-generating activities—specifically, impact pile driving, high-resolution geophysical (HRG) surveys, construction and O&M vessel use, and WTG operation. Based on the scientific research summarized below, BOEM believes it is reasonable to conclude that impact pile-driving, construction vessel, and HRG survey noise from future projects could have localized adverse effects on invertebrates. Due to the unknowns associated with proposed projects, the timing and extent of these effects on habitat and aquatic community structure cannot currently be quantified. However, as discussed below, invertebrates are relatively insensitive to underwater noise in comparison to other aquatic organisms like fish and marine mammals. Therefore, the

severity of these impacts is likely to be limited to short-term impacts on individuals with no measurable effects at the population level.

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

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 root mean square decibels (dB_{RMS}), occasionally reaching as high as 128 dB_{RMS}, in the 10-hertz (Hz) to 8-kilohertz (kHz) range. This is consistent with the noise levels observed at the BIWF (110 to 125 decibels referenced to a pressure of one micropascal [dB re 1 µPa] sound pressure level [SPL] RMS) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on invertebrates could be more intense and extensive than those considered herein, but additional research is required to determine if significant effects on invertebrates are likely to occur. In general, anticipated noise and particle motion levels are below established behavioral thresholds for invertebrates, comparable to the environmental baseline in busy marine traffic areas and are unlikely to be detectable to invertebrates. WTG foundations are readily colonized by diverse invertebrate communities (Degraer et al. 2020; Hutchison et al. 2020c), indicating that operational noise has a **negligible** adverse effect on habitat suitability for these species.

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

measurable impacts on individual invertebrates. On this basis, noise effects on invertebrates from future wind energy development in the GAA are likely to be **minor** adverse and limited to short-term impacts during project construction.

Presence of structures: The future addition of up to 3,008 new WTG and OSS foundations in the invertebrate GAA could result in artificial reef effects that influence invertebrate community structure within and in proximity to the project footprints. As discussed under anchoring and new cable emplacement/maintenance, artificial reefs could support species range shifts and expansions, nonnative species, and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). This could in turn influence the abundance and distribution of many invertebrates. For example, researchers observed changes in invertebrate community composition in sediments surrounding BIWF structures associated with changes in sediment composition caused by nutrient enrichment and the accumulation of shell hash from mussel colonies formed on the structures (Hutchison et al. 2020c). The resulting effects on invertebrates would vary by species. For example, invertebrates that colonize hard surfaces, like mussels, tunicates, and sponges, would benefit from the new habitats created by offshore wind farms. Other invertebrate species, such as crabs, worms, and lobsters, that use these complex habitats for cover and foraging would similarly benefit. In contrast, invertebrate species associated with soft-bottom substrates would lose some habitat and could also be affected by changes in nutrient cycling associated with reef effects. Impacts to invertebrates could range from **moderate** beneficial for organisms associated with hard surfaces to **minor** adverse for organisms associated with soft-bottom habitat.

While reef effects would largely be limited to the areas within and or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that could influence invertebrate community structure in the future. The likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research.

Hydrodynamic disturbance resulting from the development of offshore wind farms is a topic of emerging concern because of potential effects on the Mid-Atlantic Bight cold pool (Chen et al. 2016). The cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of marine fish and invertebrate species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). Several lease areas within the RI/MA WEA are located on the approximate northern boundary of the cold pool. Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and invertebrate community structure, but the extent and biological significance of these potential effects are unknown.

BOEM has conducted a modeling study to predict how offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including full build-out of both WEAs with a total of 1,063 WTG and OSS foundations. BOEM determined that all model scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. Johnson et al. (2021) used an agent-based model to evaluate how these environmental changes could affect planktonic larval dispersal and settlement

for two fish species and the Atlantic sea scallop. They determined that offshore wind development could affect scallop larval dispersal patterns, leading to increases in larval settlement density in some areas and decreases in others. For example, larval dispersal to waters southwest of Block Island is predicted to increase while dispersal to waters south of Martha's Vineyard would decrease under all modeled scenarios (Johnson et al. 2021). These localized effects are unlikely to be biologically significant at population levels, as sea scallop larvae originate in both local and distant spawning areas and are dispersed throughout the region (Johnson et al. 2021). Further, localized changes in larval recruitment may not necessarily translate to negative effects on adult biomass, as sea scallops can be prone to overcrowding and reduced growth rates in areas with high larval recruitment (Bethoney and Stokesbury 2019).

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

Sediment deposition and burial: As previously noted, cable placement and other construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. The resulting effects on invertebrates would likely be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017) but would vary in extent and severity depending on the type and extent of disturbance and the nature of the substrates. Invertebrates like burrowing bivalve clams and burrow-forming amphipods are highly tolerant to burial (Gingras et al 2008; Johnson 2018). More sedentary invertebrates that cannot move within the sediment column as quickly, such as tube-dwelling worms, could exhibit stress or mortality if completely buried (Johnson 2018). Some invertebrate species and their eggs and larvae could be adversely affected by burial by as little as 0.4 inch (10 mm) of fine sediment (Wilber and Clarke 2001), but indicators of stress are typically associated with burial depths on the order of 2 inches or more (Johnson 2018). Burial effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on invertebrates but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels, resulting in short-term **minor** adverse effects on invertebrates, including some habitat-forming invertebrate species.

3.6.1.2.2 Conclusions

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

Should the proposed Project not be built, BOEM expects ongoing and future activities, including those related to offshore wind, will continue to affect invertebrates in the GAA. Invertebrates would continue to be exposed to a range of short- to long-term impacts from habitat disturbance, displacement, injury, mortality, and reduced reproductive success resulting from a variety of activities. These primarily include

resource exploitation/regulated fishing effort, bottom-disturbing fishing activities, dredging, installation of new offshore structures and transmission cables, the presence of structures, and climate change.

Reasonably foreseeable activities other than offshore wind include commercial and recreational fishing effort; increasing vessel traffic; increasing construction, marine surveys, marine minerals extraction, port expansion, and channel-deepening activities; and the installation of new towers, buoys, and piers. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on invertebrates, primarily driven by ongoing dredging and fishing activities.

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

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

3.6.2 Environmental Consequences

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

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

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

Design Parameter	Description
Fewer WTGs could be permitted	This would result in fewer offshore structures and reduced IAC length. This would reduce the extent of short-term to permanent impacts on benthic habitat and invertebrates by reducing the extent of benthic habitat disturbance and suspended sediment deposition impacts from installation of foundations, cables, and scour and cable protection, and associated vessel anchoring activities; reducing the extent and duration of underwater noise impacts from WTG foundation installation; and reducing the extent of reef and hydrodynamic effects resulting from structure presence.
The use of a casing pipe method to construct the RWEC sea-to-shore transition	This would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam (Zeddies 2021).
The use of a temporary cofferdam for RWEC sea-to-shore transition construction	This would reduce sediment deposition and burial effects on invertebrates.

See Appendix E1 for a summary of IPFs analyzed for benthic habitat and invertebrates across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Appendix E, Table E2-3. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3 (see footnote in Section 3.6.1.1.1). Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives. Table 3.6-3 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. These analyses consider the implementation of all EPMs proposed by Revolution Wind to avoid and minimize impacts to benthic habitat and invertebrates. These EPMs are summarized in Appendix F, Table F-1.

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

It is important to note that the impact analyses for benthic habitat and invertebrates are necessarily interrelated because habitat-forming invertebrates are an integral component of benthic habitat structure. For example, the tubes formed around burrows created by certain sand- and mud-dwelling invertebrates are commonly exposed by sediment mobility, creating complex three-dimensional cover. Corals,

anemones, and other types of invertebrates that attach to hard substrates like cobbles and boulders similarly create complex cover and habitat. These invertebrate-created features are important components of benthic habitat structure used by a diversity of fish and other organisms. Therefore, many IPFs are discussed only in terms of their potential effects on invertebrates, as any impact to benthic habitat structure would occur through effects on habitat-forming invertebrates.

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

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

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Benthic Habitat						
Anchoring and new cable emplacement/ maintenance	**Offshore**: Under the No Action Alternative, the Project would not be constructed and no Project-related vessel anchoring or cable emplacement activities would occur. No associated effects would occur in the GAA and therefore the impacts of this IPF would be **negligible** adverse.	**Offshore**: Seafloor preparation, specifically boulder relocation and sandwave leveling, and cable installation activities during construction would impact approximately 378 and 855 acres of large-grained complex and complex habitat, respectively, and 2,217 acres of soft-bottom habitat within the RWF and RWEC construction footprints. This seafloor disturbance would constitute short- to long-term impacts and long-term habitat modification that would constitute a **minor** adverse impact to benthic habitat. The IAC, OSS-link cable, and RWEC would not require routine maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of invertebrates using these habitats. These O&M impacts would be short term in duration and would recover over time without mitigation and would therefore be **minor** adverse. There would be no cumulative impacts from this IPF associated with other planned and foreseeable future wind energy projects. BOEM estimates a cumulative total of 3,178 acres of anchoring and mooring-related disturbance and 4,009 acres of cabling-related disturbance for the Proposed Action within the benthic GAA. Short-term disturbance impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas complex benthic habitats could be permanently impacted and could take a decade or more to recover full habitat function in some cases. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats.	**Offshore**: See Section 3.6.2.4.1 for construction impact analysis. Anchoring and cable maintenance O&M effects on benthic habitat would be similar to the Proposed Action: **minor** adverse. Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats under all proposed configurations. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover.			
Climate change	**Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes could indirectly affect benthic habitat structure and composition through a variety of mechanisms. For example, changes in freshwater runoff rates and the frequency of large storm events could change the rate of delivery of fine sediments to nearshore environments and sediment transport patterns in the offshore environment. These trends are expected to continue under the No Action Alternative. The severity of impacts on benthic habitat resulting from climate change are uncertain but are anticipated to range from **minor** to **moderate** adverse and would be effectively permanent.	**Offshore**: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change would result in **moderate** adverse cumulative impacts to benthic habitat.	**Offshore**: The types of impacts from global climate change described for the No Action Alternative would occur under Alternatives C through F but, as with the Proposed Action, these alternatives could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts. When combined with other past, present, and reasonably foreseeable actions, climate change would result in **moderate** adverse cumulative impacts to benthic habitat under all proposed configurations of Alternatives C through F.			
Presence of structures	**Offshore**: Under the No Action Alternative, the Project would not be constructed and no Project-related structures would be placed within the benthic habitat GAA. No associated effects would occur in the GAA and therefore the impacts of this IPF would be **negligible** adverse.	**Offshore**: The installation of 102 offshore structures in the form of monopile foundations with associated scour protection would result in the direct disturbance of benthic habitats. These impacts would be long term in duration, but the affected habitats would develop into functional complex habitat over time as they are colonized by habitat-forming invertebrates. Habitats would recover after structures are decommissioned and removed. Therefore, the presence of structures would result in a long-term **moderate** adverse effect on benthic habitat during construction.	**Offshore**: See Section 3.6.2.4.1 and 3.6.2.4.2 for construction and O&M impacts. Alternatives C through F would result in the installation of 56 to 93 new offshore wind energy structures in the GAA, resulting in the long-term alteration of benthic habitat composition by foundations, scour protection, and cable protection. For comparison, Alternatives C and E would reduce seafloor			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		During O&M, the Proposed Action would permanently alter benthic habitats within the GAA, generating an array of effects on benthic habitat function. Soft-bottom habitats would be permanently displaced while effects on large-grained complex and complex benthic habitats would range from short term to long term or permanent. Some benthic species could recolonize new hard surfaces within 2 to 4 years while others take a decade or more to recover from damage and/or colonize new surfaces like concrete mattresses. This would constitute a long-term reduction in benthic habitat function. In contrast, biologically productive reef effects would likely develop within 3 to 4 years after construction, continuing to mature over the life of the Project. These effects could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community. There would be no cumulative impacts from this IPF associated with other planned and foreseeable future wind energy projects. The alterations in substrate composition resulting from the Proposed Action described above would be limited to the area of influence around each foundation but would be long term in duration, as changes in substrate composition from the accumulation of shell hash and altered substrate chemistry would continue to persist after the structures are removed during decommissioning. As such, reef effects from the presence of structures would result in cumulative long-term effects on benthic habitat and would range from **moderate** beneficial to **minor** to **moderate** adverse.	disturbance during construction by up to 35%; Alternative D would reduce seafloor disturbance by up to 21.5%; and Alternative F would reduce seafloor disturbance by up to 43%, as compared to the maximum-case scenario for the Proposed Action. Implementation of Alternative F in conjunction with Alternatives C, D, and E would further reduce seafloor disturbance for these alternatives by up to 8%, 21.5%, and 8%, respectively. The resulting impacts would be limited in extent to the area of influence around each foundation but would be long term in duration. As such, reef effects from the presence of structures under Alternatives C through F would contribute to cumulative long-term effects on benthic habitat that would range from **moderate** beneficial to **minor** to **moderate** adverse.			
Invertebrates						
Accidental releases and discharges	**Offshore**: Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the invertebrate GAA. However, the combined impacts on invertebrate resources (mortality, decreased fitness, disease) from accidental releases and discharges are expected to be minimal, localized, and short term due to the likely limited extent and duration of a release. On this basis, the effects of this IPF on invertebrates under the No Action Alternative would be **negligible** adverse. In the unlikely event that accidental spills should occur, impacts to benthic habitats could range from **minor** to **moderate** adverse in significance depending on the size of the spill and the nature of the materials involved.	**Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of environmentally damaging trash or debris (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Given these restrictions, the risk to invertebrates from trash and debris from the Project, including habitat-forming invertebrates that contribute to benthic habitat structure, is **negligible** adverse. In the unlikely event that accidental spills should occur, adverse impacts to benthic habitats could range from **minor** to **moderate** adverse in significance depending on the size of the spill and the nature of the materials involved. When combined with other offshore wind projects, up to approximately 19 million gallons of coolants, fuels, oils and lubricants could cumulatively be stored within WTGs and OSSs in the invertebrate GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. However, higher volume spills of toxic materials could occur due to unanticipated events, such as a vessel allision with a WTG foundation. When low-probability, unanticipated events are considered, the Proposed Action when combined with other past, present, and reasonably foreseeable projects, poses a potential for **minor** to **moderate** adverse cumulative impacts on invertebrates that could range from short term to long term in duration.	**Offshore**: Given restrictions on the discharge or disposal of solid debris, as described for the Proposed Action, effects on invertebrates and on benthic habitat structure through impacts on habitat-forming invertebrates from trash and debris Alternatives C through F would be **negligible** adverse. The Project would follow strict oil spill prevention and response procedures during all phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that an unforeseen accident results in a high-volume spill, **minor** to **moderate** adverse effects on invertebrates and on benthic habitat structure through impacts on habitat-forming invertebrates could potentially result. Those impacts could range from short term to long term in duration, depending on the size of the accident, the nature of the materials involved, and the types type and location of habitat impacts. Alternatives C through F could slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the mid-Atlantic OCS. All future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. This would minimize, but not completely eliminate the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In			

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			the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects on invertebrates could potentially result.			
Anchoring and new cable emplacement/ maintenance	**Offshore**: Offshore energy facility construction would involve direct disturbance of the seafloor, leading to direct impacts on invertebrates. In general, however, these effects would be localized to the disturbance footprint and vicinity. The severity of these effects would vary depending on the species and life stage sensitivity to specific stressors that extend into the area, resulting in **minor** to **moderate** adverse impacts on invertebrates.	**Offshore**: Seafloor preparation, cable trenching, dredging, vessel anchoring, and short-term bed disturbance at the sea-to-shore transition site would directly disturb soft-bottom benthic habitat by crushing and displacing epifaunal organisms on the bed surface and liquifying sand and mud sediments from the bed surface to depths of up to 6 feet, killing and displacing benthic infauna within the cable path. The Proposed Action includes several EPMs, listed in Table F-1 in Appendix F, that would limit, but not completely avoid, crushing, burial, and entrainment impacts on invertebrates. While some impacts would be unavoidable, the affected habitats would recover naturally over time, and impacts on invertebrates are unlikely to be measurable at the population level. Therefore, adverse impacts to invertebrates from this IPF during construction would be **minor** adverse**.** Up to 10% of cable protection could need to be replaced over the life of the Project. The IAC, OSS-link cable, and RWEC would also be removed from the seafloor during Project decommissioning. Resulting effects from O&M and decommissioning would be short term in duration, and similar in nature but lesser in magnitude than those resulting from Project construction. Therefore, these adverse effects would be **minor** adverse**.** BOEM estimates a cumulative total of 5,850 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the benthic GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts.	Alternatives C through F would reduce the total length of IAC and anchoring relative to the Proposed Action, meaning that the total amount of construction- and maintenance-related impacts on invertebrates would decrease commensurately. This decrease would be noticeable in comparison to the Proposed Action. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSSs into the water column. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse**.** Alternatives C through F surface occupancy would noticeably reduce the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to benthic habitats and habitat-forming invertebrates.				
Climate change	**Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the invertebrate community of the GAA. For example, several invertebrate species are shifting in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). These trends are expected to continue under the No Action Alternative. The intensity of adverse impacts resulting from climate change are uncertain but are anticipated to be **minor** to **moderate** adverse**.**	**Offshore**: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for many invertebrates within the GAA. The intensity of climate change cumulative impacts on invertebrates are uncertain and are likely to vary considerably between species, resulting in **moderate** adverse effects.	**Offshore**: Climate change–related impacts to invertebrates under Alternatives C through F would be the same as those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on invertebrates is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects.			
EMF	**Offshore**: Under the No Action Alternative, up to 10,024 miles of cable would be added in the invertebrate GAA, producing EMF effects in the immediate vicinity of each cable during operations. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF	**Offshore**: Construction impacts would not result in EMF impacts. Operation of the IAC, OSS-link cable, and RWEC would generate EMF and substrate heating effects, altering the environment for benthic invertebrates and other organisms associated with those habitats. The evidence for EMF effects on invertebrates is equivocal, varying considerably between species and based on the type and strength of EMF source (Albert et al. 2020; Hutchison et al. 2020a, 2020b). Given this uncertainty, the potential	**Offshore**: See Section 3.6.2.5.2 for analysis of O&M impacts. Construction impacts would not result in EMF impacts. Alternatives C through F would generate EMF effects of varying intensity along the IAC, OSS-link cable, and RWEC length. These			

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	effects from cable operation. Accordingly, long-term effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse for projects using HVAC transmission. Projects that use HVDC transmission could result in greater (long-term **minor** or **moderate** adverse) effects on invertebrates.	permanent effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC (versus HVDC) transmission and apply similar design measures to those included in the Proposed Action avoid and minimize EMF effects on the environment. While uncertainties remain, cumulative adverse impacts to invertebrates from EMF and substrate heating effects are likely to be **minor** adverse**.**	EMF effects would combine with those generated by the 10,024 miles of new and existing transmission cables from the other new offshore wind facilities planned on the mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those described for the No Action Alternative but would occur over a larger area, as determined by the broader project footprint. Cumulative impacts to invertebrates would therefore range from **negligible** to **minor** adverse.			
Light	**Offshore**: Artificial light can attract mobile invertebrates and can influence biological functions (e.g., spawning) that are triggered by changes in daily and seasonal daylight cycles (Davies et al. 2015; McConnell et al. 2010). BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021; Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on invertebrates. Given the minimal and localized nature of lighting effects anticipated under this guidance, the related effects from proposed future activities on invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure, are likely to be **negligible** adverse.	**Offshore**: Lights would be required on offshore platforms and structures, vessels, and construction equipment during construction and O&M of the RWF. Consistent with BOEM guidance (BOEM 2021; Orr et al. 2013), construction vessels would implement lighting design and operational measures to eliminate or reduce lighting impacts on the aquatic environment. Although individual invertebrates could detect light from vessels and could exhibit behavioral responses (e.g., squid being attracted to the lights), these impacts are not expected to measurably affect invertebrates at population levels because of the limited area of impact at any given time and the limited duration of Project activities. Any resulting adverse impacts on invertebrates would be short term in duration and biologically insignificant, and therefore **negligible** adverse**.** All future projects would also be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be similar to those impacts described under the No Action Alternative: **negligible** adverse.	**Offshore**: Construction vessel lighting has the potential to affect invertebrates. Many invertebrates are attracted to and/or respond behaviorally to light in the environment, and exposure to artificial light can alter biological responses (e.g., spawning) that are triggered by changes in day length and light intensity (Davies et al. 2015; McConnell et al. 2010). Revolution Wind would follow BOEM guidance to minimize lighting effects. Alternatives C through F would reduce short-term construction-related lighting impacts by decreasing the total duration of construction vessel activity, the level of impact would otherwise be similar in nature to the Proposed Action: **negligible** adverse. Artificial light from structures during Project operations and from vessels used for O&M and decommissioning could affect invertebrates, including habitat-forming invertebrates that contribute to benthic habitat structure. Given the minimal and localized nature of anticipated lighting effects, however, any indirect effects on invertebrates from light generated during O&M and decommissioning are expected to be **negligible** adverse. BOEM estimates a cumulative total of 3,066 to 3,103 offshore WTGs and OSS foundations for the Project plus all other future offshore wind projects in the invertebrate GAA. The RWF and all future projects would be expected to comply with BOEM design guidance for avoiding and minimizing adverse lighting impacts on the environment. Therefore, the cumulative impacts associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would **negligible** adverse, mostly attributable to existing, ongoing activities.			
Noise	**Offshore**: Underwater noise impacts from future wind energy development would likely result in short-term localized effects on some invertebrate species in immediate proximity to intense sound sources like pile driving. These effects would end when construction is complete. While individual invertebrates could be harmed by	**Offshore**: Construction-related sources of sound pressure and vibration that could affect invertebrates are impact and vibratory pile driving, and unexploded ordnance (UXO) detonation. Particle motion effects from pile driving would be limited to short-term behavioral responses, most likely lasting for the duration of the noise impact and limited periods (minutes to hours) following exposure. Particle motion effects from UXO detonation could result in mortality of organisms on or immediately adjacent	**Offshore**: See Section 3.6.5.2.1 for analysis of construction impacts. Underwater noise effects on invertebrates resulting from O&M and decommissioning of Alternatives C through F would be similar in magnitude but reduced in extent relative to those			

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	noise impacts, potentially harmful impacts would be limited in extent and population-level effects would likely be unmeasurable. Underwater noise from the operation of individual wind farms would last for the life of each project. However, the resulting noise effects are not likely to produce measurable impacts on individual invertebrates. On this basis, noise effects on invertebrates from future wind energy development in the GAA are likely to be **minor** adverse.	to the munition, and short-term behavioral responses at greater distance. While mortality-level effects could occur, construction-related adverse impacts are likely to be **minor** overall because 1) the areas of effect are small relative to the available habitat, and 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae, which can range from 1% to 10% per day or higher (White et al. 2014). The RWF WTGs would generate operational noise effects throughout the life of the Project, ending when the Project is decommissioned. Invertebrates lack specialized hearing organs and cannot sense sound pressure in the same way as fish and other vertebrates. Invertebrates can sense sound as particle motion, but particle motion effects dissipate rapidly and are usually undetectable within a few feet of the source. Certain species, specifically squid, may be more sensitive to sound than invertebrates as a group. However, the sound pressure and particle motion effects observed at the BIWF are well below levels associated with injury and behavioral responses in invertebrates and unlikely to cause measurable effects on these species. Moreover, the rapid development of benthic invertebrate communities on operational wind farms worldwide indicates that operational noise has little if any effect on invertebrates. Collectively, this information indicates that operational noise effects on invertebrates would be **negligible** adverse. Likewise, cumulative effects on invertebrates resulting from underwater noise are also likely to be **minor** adverse.	described for the Proposed Action. Noise impacts on invertebrates are expected to be limited to short-term behavioral effects on individuals within tens of feet of each sound source and therefore **negligible** to **minor** adverse. Alternatives C through F would generate underwater noise effects similar to those described above for the Proposed Action but over an noticeably smaller area. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the mid-Atlantic OCS. Invertebrates near impact and vibratory pile-driving activities could be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population at the scale of the GAA. On this basis, cumulative effects on invertebrates resulting from underwater noise caused by Alternatives C through F are likely to be **negligible** to **minor** adverse.			
Bycatch	**Offshore**: A range of monitoring activities has been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect invertebrates. For example, the South Fork Wind Fisheries Research and Monitoring Plan (SFW and Inspire Environmental 2020) includes both direct sampling of invertebrates and the potential for bycatch of invertebrates and/or damage to habitat-forming invertebrates by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on invertebrates, although the distribution of those impacts could change. As such, any bycatch-related impacts on invertebrates would be **negligible** to **minor** adverse and short term in duration.	**Offshore**: The FRMP would result in impacts to individual invertebrates, but the extent of habitat disturbance and number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. As such, habitat impacts from FRMP implementation would likely be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse effect on invertebrates. Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. These monitoring methods would result in intentional and bycatch mortality of invertebrates and could also result in unintentional damage to habitat-forming invertebrates. As such, cumulative impacts from bycatch associated with monitoring activities under the Proposed Action in combination with other planned and future offshore wind projects would be **negligible** to **minor** adverse, with the impacts ranging from short term to long term in duration.	**Offshore**: The same FRMP included under the Proposed Action or a similar plan with modifications would be implemented under Alternatives C through F. This would result in direct sampling and incidental bycatch mortality of invertebrates as well as incidental damage to habitat-forming-invertebrates by sampling gear that contacts the seabed. The extent of habitat and number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any invertebrate species at the population level. However, the timing and distribution of impacts may change. As such, Alternatives C through F would result in short-term bycatch impacts on invertebrates that are limited to a small number of individuals. This would therefore constitute a short-term **mino**r adverse effect on invertebrates, including habitat-forming species that contribute to benthic habitat structure. Like the Proposed Action, O&M under Alternatives C through F would include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potential sources of bycatch mortality for invertebrates from the environment. This would constitute a long-term **minor** beneficial effect on invertebrates. Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. This would result in cumulative impacts to invertebrates			

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			from sampling and bycatch mortality and incidental damage to habitat-forming organisms from monitoring activities in the GAA. Those effects cumulative would be **negligible** to **minor** adverse, ranging from short term to long term in duration.			
Presence of structures	**Offshore**: The future addition of up to 3,008 new WTG and OSS foundations in the invertebrate GAA could result in artificial reef effects that influence invertebrate community structure within and in proximity to the project footprints. Impacts to invertebrates could range from **moderate** beneficial for organisms associated with hard surfaces to **minor** adverse for organisms associated with soft-bottom habitat. While hydrodynamic impacts on invertebrates are likely to vary between species, localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource.	**Offshore**: Invertebrates within the benthic disturbance footprints for foundation installation could be exposed to crushing and burial effects, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. The time required for recovery would vary depending on the type of habitats affected, ranging from short term for invertebrates found in soft-bottom habitats to long term for invertebrates associated with large-grained complex and complex habitats. Therefore, adverse effects to invertebrates from construction of structures would be **minor adverse.** On balance, the effects of foundation and scour protection presence on invertebrates are likely to range from **minor** adverse to **moderate** beneficial in terms of the overall O&M impact, varying by species. Concrete mattresses used for cable protection may have to reside in the environment for some time before they provide suitable invertebrate habitat, which would constitute a long-term **minor** adverse impact depending on the amount of cable protection used. O&M would also include regular inspections of offshore structures and opportunistic removal of derelict fishing gear and other accumulated debris over the life of the Project. Derelict gear and debris removal from structures would constitute a long-term **minor** beneficial effect. BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,110 WTG and OSS foundations within the invertebrate GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential impacts of these broader cumulative effects on invertebrates in general. However, cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial in terms of overall impact.	**Offshore**: Invertebrates within the respective footprints for Alternatives C through F would be exposed to crushing and burial effects similar in nature but reduced in extent relative to those described for the Proposed Action due to a smaller number of WTGs. For comparison, Alternatives C and E would reduce seafloor disturbance during construction by up to 35%; Alternative D would reduce seafloor disturbance by up to 21.5%; and Alternative F would reduce seafloor disturbance by up to 43%, as compared to the maximum-case scenario for the Proposed Action. Implementation of Alternative F in conjunction with Alternatives C, D, and E would further reduce seafloor disturbance for these alternatives by up to 8%, 21.5%, and 8%, respectively. Therefore, the resulting effects from this IPF would similarly range from **negligible** to **minor** adverse during construction. During O&M, Alternatives C through F would produce similar hydrodynamic and reef effects on invertebrates to those described for the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Reef and hydrodynamic effects would be distributed differently (see Table 3.6-17, Table 3.6-18, and Table 3.6-19). While the extent of reef and hydrodynamic effects would vary between alternatives, the impacts to invertebrates would be of the same nature, general scale, and magnitude as those described for the Proposed Action. These effects would therefore range from **minor** adverse to **moderate** beneficial, with some invertebrate species experiencing a permanent loss of suitable habitat while other species would gain habitat and otherwise benefit from increased biological productivity. BOEM estimates the Proposed Action and other planned future projects will result in the development of up to 3,066 to 3,103 foundations within the invertebrate GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential biological significance of broader cumulative effects on invertebrates. However, BOEM anticipates that cumulative effects could vary by species, and would likely				

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
			range from **minor** adverse and beneficial to **moderate** adverse and beneficial.			
Sediment deposition and burial	**Offshore**: Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. Burial effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on invertebrates but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels, resulting in short-term **minor** adverse effects on invertebrates, including some habitat-forming invertebrate species.	**Offshore**: Jet plow trenching and dredging used to install the IAC, OSS-link cable, and RWEC and construction of the sea-to-shore transition would disturb the seafloor and release plumes of suspended sediment into the water column. However, the sand and mud substrates on the mid-Atlantic OCS are continually reshaped by bottom currents and sediment delivery from upland sources (Daylander et al. 2012). This means that these habitats and the invertebrates associated with benthic habitat are regularly exposed to and therefore must be able to recover from burial by mobile sediments. In this context, the short-term effects of sediment deposition on benthic habitats would be **negligible** to **minor** adverse. Up to 10% of cable protection could need to be replaced over the life of the Project under the Proposed Action. Cable protection maintenance and decommissioning effects would range from short-term behavioral disturbance of benthic infauna and other invertebrates accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and invertebrates subject to burial effects greater than 0.4 inch (10 mm). These adverse O&M effects would be **minor** adverse. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would also result in **minor** adverse cumulative impacts on benthic habitats and invertebrates.	**Offshore**: See Section 3.6.5.2.1 for construction analysis. Cable protection maintenance and decommissioning would produce similar effects as those described for the Proposed Action, although reduced in extent. Therefore, resulting adverse effects from O&M and decommissioning would be **minor** adverse**.** Sediment deposition and burial impacts would result from the estimated up to 24,358 cumulative acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the invertebrate GAA. While suspended sediment effects from future projects cannot be predicted without area-specific modeling, these effects are expected to be similar in magnitude and extent to those described for the Proposed Action: **minor** adverse. Cumulative short-term adverse impacts from all planned and future projects are not likely to have measurable population-level effects on any invertebrate species. However, more extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments.				

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3.6.2.2 Alternative B: Impacts of the Proposed Action on Benthic Habitat

3.6.2.2.1 Construction and Installation Offshore Activities and Facilities

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The construction of the RWF and RWEC would result in a range of short-term and long-term impacts on benthic habitat from vessel anchoring, cable installation, seafloor preparation, and placement of cable protection. The estimated acres of construction-related impacts on benthic habitat resulting from each of these construction activities are summarized in Table 3.6-4. These values represent the best available estimate for the current Proposed Action design. However, micrositing will be used during construction to minimize impacts on large-grained complex and complex benthic habitats to the greatest extent practicable. This would shift some of the projected impacts on complex habitats to soft-bottom habitat.

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

Construction Activity	Maximum Construction Disturbance Footprint (acres)	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
General construction vessel anchoring*	3,142	19.1%	30.1%	50.7%
Jack-up vessel anchoring†	21.1	20.0%	30.1%	49.9%
Pull-ahead anchoring†	16.1	0.0%	21.4%	78.2%
IAC and cable protection‡	2,224	18.6%	26.1%	55.3%
OSS-link cable and cable protection‡	109.1	12.5%	26.7%	60.8%
RWEC installation and cable protection‡,§	1,077	2.3%¶	22%	75.7%
RWEC cable joint installation	40.8			

Construction Activity	Maximum Construction Disturbance Footprint (acres)	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Sea to shore transition	0.8	0%	0%	100%
Maximum bed disturbance footprint	6,615	16.0%	27.4%	56.8%

* Estimated total assuming that seafloor impacts from general construction vessel anchoring will occur within a 656-foot radius around each foundation (COP Table 4.1.1-1); acreage shown is the total area for all foundations minus the jack-up vessel anchoring footprint.

† Jack up vessel anchoring impacts based on an estimated 0.18 acre of seafloor impacts per vessel jack-up event. OSS foundations will require one jack-up event per installation. An estimated 85% of WTG installations will require one jack-up event and 15% will require two jack-up events. Pull-ahead anchoring impact estimate calculated using an anchor width of 18 feet, typical drag lengths per set, in sand and medium clay sediments for a 5-metric-ton STEVIN MK3 anchor (Vryhof 2018), and 200, 150, and 50 anchor sets during construction of the RWEC-RI, RWEC-OCS, and OSS-link cable, respectively. Values consider the proportional distribution of mapped sediment types along each cable path.

‡ Ranges represent the estimated extent of benthic habitat impacts for IAC, OSS-link cable, and RWEC construction. The standard estimate is the total extent of overlapping habitat impacts from seafloor preparation (boulder relocation, sandwave leveling), cable installation, and placement of temporary cable protection. The proportional distribution of impacts by habitat type for each Project element is based on the habitat composition of the approved impact corridor for each Project element. The acres of habitat exposed to short- and long-term impacts would likely fall somewhere within this range. The total area impacted by placement of cable protection is 74.1 acres for the IAC, 4.4 acres for the OSS-link cable, and 60.6 acres for the RWEC. These impacts would occur within the respective seafloor preparation footprints for each Project component, predominantly in complex benthic habitat where boulders and other hard substrates prevent cable burial. The cable joint installation impact estimate assumes four cable joint installations, two each within RWEC segments on the OCS and in state waters, with a 673-foot-wide impact corridor at each joint location. Acreages shown are non-overlapping impacts extending beyond the seafloor preparation corridor for cable installation.

§ Bed disturbance footprint based on 40-m-wide installation corridor, assuming no corridor overlap between parallel cable paths for RWEC #1 and RWEC #2.

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

While placement of concrete mattress cable protection would occur during Project construction, these features would remain in place throughout the operational life of the Project and would have long-term effects on habitat composition in all habitat types. These long-term effects are therefore considered in Section 3.6.2.2.2 under O&M and Decommissioning.

Cable routes would be microsited in soft-bottom habitat to the extent practicable; however, some cable installation impact acreage would also occur in complex or potentially complex benthic habitat within these installation corridors. Jack-up vessel anchoring during WTG and OSS foundation installation would impact approximately 21.1 acres of seafloor habitat. Some portion of these impacts would occur in areas previously impacted by seafloor clearing and subsequently impacted by placement of scour protection. Vessel and pull-ahead anchoring would impact an additional estimated 3,178 acres of seafloor. Benthic habitat in the areas wherein anchoring impacts could occur is composed of approximately 19.1% large-grained complex, 30.0% complex, and 50.9% soft-bottom habitats. However, the total acreage and distribution of anchoring impacts cannot be predicted with certainty, as anchoring requirements and vessel positioning are affected by wind and current conditions in real time. The vessel anchoring plan developed by the applicant will be used to identify and avoid impacts to large-grained complex and complex benthic habitats to the greatest extent practicable. Impacts on bedforms in soft-bottom benthic

habitat are expected to recover within 18 to 24 months following initial disturbance as a result of natural sediment transport processes (Daylander et al. 2012) and recolonization by habitat-forming organisms from adjacent habitats. This estimate is based on observed recovery rates from cable installation impacts at the nearby BIWF (HDR 2020) and for similar bed disturbance impacts observed in other regions (de Marignac et al. 2009).

Prior to construction, the seafloor within the designated construction footprint would be cleared using a towed plow to relocate boulders and flatten sediment waves. Sediment waves, in the form of ripples and mega-ripples, can interfere with jet plow operation and the ability to achieve desired burial depths. Sediment waves are also indicative of bed mobility that poses a risk of cable exposure. Dredging could be used to increase cable burial depth in specific areas where the risk of cable exposure is highest. The disturbance estimates presented above include seafloor preparation effects on soft-bottom benthic habitat. Seafloor preparation in large-grained complex, complex, and heterogenous complex benthic habitats would clear larger substrates like boulders and cobbles from the construction footprint by rolling them to the edge of the clearance area using a large plow dragged behind a construction vessel. Boulder relocation would permanently modify the distribution of substrates in the affected area, resulting in a long-term effect on benthic habitat composition. Moreover, habitat-forming invertebrates damaged or killed during boulder relocation could take several years to fully recover. This would constitute a long-term effect on benthic habitat structure.

Seafloor preparation, specifically boulder relocation and sandwave leveling, and cable installation activities would impact approximately 158 and 743 acres of large-grained complex and complex habitat, respectively, and 2,375 acres of soft-bottom habitat within the RWF and RWEC construction footprints. This seafloor disturbance would constitute a long-term habitat modification resulting in **minor** adverse impacts to benthic habitat (see also O&M effects in Section 3.6.2.2.2).

Presence of structures: The installation of up to 102 offshore monopile foundations with associated scour protection would result in the direct disturbance of benthic habitats. The duration of these impacts would vary depending on the type of benthic habitat impacted. Disturbance of soft-bottom benthic habitat would flatten sandwaves, pits, and depressions and kill or displace habitat-forming invertebrates living on and in the seafloor within the impact footprint. Disturbance of complex benthic habitat during seafloor preparation could change benthic habitat composition by relocating boulders and cobbles and exposing soft substrates. The estimated extent of effects by construction activity is summarized in Table 3.6-5. All monopile foundation, cable protection system, and scour protection placement impacts would occur in areas that were previously disturbed during seafloor preparation. Impacts to benthic habitat from the presence of structures would be long term in duration, but the affected habitats would develop into functional complex habitat over time as they are colonized by habitat-forming invertebrates. Those habitats would recover after structures are decommissioned and removed. Consistent with the impact level definitions presented in Table 3.2-2, the presence of structures would therefore result in a long-term **moderate** adverse effect on benthic habitat.

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

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

Construction Activity	Maximum Construction Disturbance Footprint (acres)	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Seafloor preparation*	731	18.9%	29.6%	51.5%
Monopile foundations and scour protection†	72.8	20.0%	30.1%	49.9%
Cable protection systems‡	7.1			

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

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

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

While placement of the monopile foundations, cable protection systems, and scour protection are elements of Project construction and installation, these features would remain in place throughout the operational life of the Project and would have long-term effects on habitat composition in all habitat types. These long-term effects are therefore considered in Section 3.6.2.2.2 under O&M and Decommissioning.

3.6.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce similar effects as those described for construction and installation in Section 3.6.2.2.1. These effects would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of invertebrates using these habitats. Habitat-forming benthic invertebrates could be damaged or killed outright, but the affected hard surfaces would be recolonized over time. Impacts to benthic habitat could include disturbance and relocation of boulders and hard substrates and flattening of ripples and depressions. These adverse impacts would be short term in duration and would recover over time without mitigation and would therefore be **minor** adverse.

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

Effects to habitat structure resulting from impacts on habitat-forming organisms are discussed under operational impacts on invertebrates in Section 3.6.2.3.2.

The Proposed Action would alter benthic habitat composition, converting existing large-grained complex, complex, and soft-bottom benthic habitat to artificial or introduced hard surfaces. In addition, redistribution of cobbles and boulders during seafloor preparation would convert some existing hard-bottom substrate into soft-bottom substrates and vice versa. For example, anchor scars from BIWF construction created corridors of sandy soft-bottomed habitat through existing boulder fields that have persisted since the project was completed (Guarinello and Carey 2020). Similar effects would be anticipated from boulder clearing. The acres of potential impacts to benthic habitat composition and distribution by habitat type are summarized in Table 3.6-6. In general terms, RWF and RWEC installation would permanently displace some benthic habitat within the monopile footprints, would alter the character of existing hard-bottom habitat exposed to reef effects, and would convert some soft-bottom benthic habitat to new hard surfaces in the form of scour protection and concrete mattresses. These effects would be long-term to permanent in duration. In total, an estimated 186.8 acres of benthic habitat would be exposed to long-term habitat conversion effects from boulder relocation during RWF and RFEC installation and the subsequent placement of scour and cable protection within the installation footprint. Approximately, 3.1 acres of benthic habitat would be displaced by WTG monopile and OSS foundations. Seafloor preparation for foundation installation would result in the long-term modification of approximately 734 acres of benthic habitat, and the subsequent placement of monopiles, scour protection, and cable protection systems would permanently modify 78.5 acres within this footprint. Approximately 2,829 acres of benthic habitat would be modified by boulder relocation for IAC, OSS-link cable, and RWEC construction, and 139.1 acres within this footprint would subsequently be modified by placement of cable protection.

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

Operations and Maintenance and Decommissioning Activity	Maximum Seafloor Footprint (acres)	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
WTG and OSS foundations	3.1	20.2%	29.3%	50.5%
Foundation scour protection	71.4	20.0%	30.1%	49.9%
Cable protection systems*	7.1	20.0%	30.1%	49.9%
Cable protection†	139.1	18.5%	26.1%	55.3%
Total	220.7	18.4%	26.6%	55.1%

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

† Protective structures placed on exposed segments of the RWEC, IAC, and OSS-link cable, independent from cable protection systems at monopile foundations.

The precise distribution of habitat conversion impacts by benthic habitat type cannot be predicted with certainty as preconstruction micrositing will affect where Project features are ultimately located. However, the habitat conversion impacts described above would occur within areas having the habitat

composition shown in Table 3.6-6. In general, long-term impacts from boulder relocation are expected to occur in areas where boulders are most prevalent and are therefore most likely to occur in large-grained complex and complex benthic habitats. However, boulder relocation could move boulders into soft-bottom habitat, changing habitat composition. Cable protection would most likely be required in areas where hard substrates, such as boulder fields, prevent cable burial. This means that cable protection impacts are more likely to occur in large-grained complex and complex habitats, and those acres of impacts would overlap habitats previously impacted by seafloor preparation. The values presented in this EIS likely overestimate the total acres of impacts that would occur, as micrositing of the foundations and cable routes would emphasize relocating Project features into soft-bottom benthic habitat where practicable. This would reduce the extent of long-term impacts. For example, adjusting cable routes to avoid complex benthic habitat could mean that less cable protection is ultimately required. Therefore, fewer acres of long-term habitat impacts would occur.

The introduction of 102 WTG and OSS foundations would alter pelagic habitats by introducing vertical hard surfaces into the water column. Over time the foundation, surrounding scour protection, and cable protection mattresses would become colonized by sessile invertebrates, such as mussels, tunicates, anemones, and sponges, creating complex habitat. Damage to complex habitat structure from construction would also recover over time as surfaces are recolonized by habitat-forming organisms, but full recovery could require years to decades. Long-term effects to benthic habitat structure are described in greater detail under the presence of structures IPF in Section 3.6.2.3.2.

The Proposed Action would permanently alter benthic habitats within the GAA, generating an array of effects on benthic habitat function. Soft-bottom habitats would be permanently displaced while effects on large-grained complex and complex benthic habitats would range from short term to long term or permanent. Some benthic species could recolonize new hard surfaces within 2 to 4 years while others take a decade or more to recover from damage and/or colonize new surfaces like concrete mattresses. For example, concrete mattresses used at the BIWF did not exhibit surface growth of habitat-forming invertebrates after 3 years, but the structures provided refuge space for some fish and invertebrate species (HDR 2020). This would constitute a long-term reduction in benthic habitat function. In contrast, biologically productive reef effects like those observed at the BIWF would likely develop within 3 to 4 years after construction, continuing to mature over the life of the Project. These effects could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community.

3.6.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The Proposed Action would result in localized minor to moderate adverse impacts to benthic habitats and invertebrates through an estimated 3,178 acres of anchoring and mooring-related disturbance and 4,009 acres of cabling-related seafloor disturbance within the benthic habitat GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted, ranging from short term to long term or permanent. Short-term impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas complex benthic habitats could be permanently impacted and could take a decade or more to recover full habitat function in some cases. There would be no cumulative

impacts from other planned and reasonably foreseeable offshore wind projects as impacts to benthic habitat from these projects would occur outside the GAA as defined.

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

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

Presence of structures: The Proposed Action would result in the installation of 102 new offshore wind energy structures and associated scour and cable protection in the GAA, resulting in the long-term alteration of benthic habitat composition on approximately 220.7 acres of seabed. That total would include approximately 3.1 and 71.4 acres of seabed displaced by foundations and associated scour protection, respectively, and 146.2 acres affected by cable protection. The foundations would effectively displace benthic habitat, with each foundation replacing 0.03 to 0.04 acre of seabed with a vertical structure extending from the seabed to the surface. Impacts to habitat composition from scour and cable protection would vary depending on the type of habitat affected (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). When placed in soft-bottom habitat, these structures would effectively change the habitat type. When placed in large-grained complex or complex habitat, these structures would either alter the habitat type or modify benthic habitat structure through burial and damage to habitat-forming invertebrates. That habitat structure would recover and would evolve over time into functional benthic habitat as reef effects mature. In all cases, the presence of structures would constitute a long-term to permanent impact to benthic habitat. When reef effects are considered, long-term impacts to benthic habitat composition and structure could be **minor** to **moderate** adverse or **moderate** beneficial, depending on how benthic habitat change influences the broader biological community.

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

3.6.2.2.4 Conclusions

The construction and installation, O&M, and decommissioning of the Proposed Action would impact benthic habitat through several mechanisms, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by colonization of structures by habitat-forming invertebrates. These effects would alter the structure and function of benthic habitats within the maximum work area, including where cable protection is used, and create new biological hotspots that would benefit some fish and invertebrate species. Long-term to permanent habitat disturbance effects on 2,602 acres of large-grained complex and complex habitats would constitute a **moderate** adverse effect on benthic habitat. These effects would result primarily from redistribution of large-grained substrates and long-term impacts to certain types of habitat-forming organisms. These adverse effects would be partially offset by **moderate** beneficial effects on benthic habitat structure and productivity resulting from reef effects. The colonization of artificial structures by a complex community of habitat-forming organisms would increase the structural complexity of benthic habitat in and around WTG and OSS foundations. Some benthic habitat effects could persist even after the Project is decommissioned. For example, reef effects would result in shell hash accumulation around foundations that would remain after the structures are removed. This would alter the composition of sediments within the RWF beyond the life of the Project but would not be expected to negatively affect the ability of benthic habitats to support ecosystem function after the Project is decommissioned.

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

3.6.2.3 Alternative B: Impacts of the Proposed Action on Invertebrates

3.6.2.3.1 Construction and Installation

Offshore Activities and Facilities

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

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

water surface, would weather more quickly, and would therefore be less likely to negatively impact benthic habitats. As discussed in Section 3.21.1.2, in the unlikely event that accidental spills should occur, adverse impacts to benthic habitats could range from **minor** to **moderate** adverse in significance depending on the size of the spill and the nature of the materials involved.

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

Seafloor preparation, cable trenching,[14] dredging, vessel anchoring, and short-term bed disturbance at the sea-to-shore transition site would also directly disturb soft-bottom benthic habitat by crushing and displacing epifaunal organisms on the bed surface and liquifying sand and mud sediments from the bed surface to depths of up to 6 feet, killing and displacing benthic infauna within the cable path. Dredging could be used in selected areas where mobile undulations in seafloor sediments occur to allow for cable burial at greater depths. These activities would flatten ripples, mega-ripples, and biogenic depressions that provide habitat for certain invertebrates, including EFH species. Seafloor preparation, cable trenching, and sea-to-shore transition construction would impact up to 3,470 acres of benthic habitat within the installation corridors for the RWF and RWEC. Approximately 4.8% and 22.7% of these impacts would occur in large-grained complex and complex benthic habitats, respectively, and 72.5% would occur in soft-bottom habitats (see Table 3.6-4).

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

The jet plow injects water into the sediments to liquify the seafloor for cable installation. While the water intake, located near the water surface, is screened to avoid entraining (suctioning) small fish, it would unavoidably entrain and kill zooplankton and planktonic fish eggs and larvae. Zooplankton comprise a diverse group of invertebrate organisms, including larval life stages of crustaceans (crabs and lobsters), echinoderms (urchins and sand dollars), bivalves (clams and mussels), and other species as well as invertebrates that spend their entire lives as zooplankton, such as calanoid copepods. Zooplankton are a central component of the food web and provide an important prey resource for many fish, filter feeding invertebrates, and even large marine mammals like humpback whale (*Megaptera novaeangliae*) and North Atlantic right whale (NARW) (*Eubalaena glacialis*). Inspire Environmental (2019) estimated

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

potential plankton mortality from construction of the 61.8-mile South Fork Export Cable (SFEC) and 21.4-mile SFWF IAC based on jet plow intake volume and movement speed and documented plankton density. It calculated that over a billion fish eggs and 8.5 billion invertebrate zooplankton could be killed by entrainment impacts. Impacts of similar magnitude are likely to result from the construction of the Proposed Action.

While construction impacts could injure or kill invertebrates on over 7,363 acres of benthic habitat (see Table 3.6-4) and kill billions of phytoplankton, these impacts must be placed into context to evaluate overall impacts. Invertebrates associated with soft-bottom habitat are likely to recover from disturbance within 18 to 24 months (de Marignac et al. 2009; Dernie et al. 2003; Desprez 2000; HDR 2020). In contrast, some invertebrates associated with complex benthic habitat, like sponges and hydroids, could take a decade or longer to fully recover (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). Accordingly, impacts from bed disturbance could range from short term negligible adverse for mobile invertebrates like adult squid and crabs; short term minor adverse for immobile or slow-moving invertebrates like clams, scallops, and worms in soft-bottom habitat; to minor long-term adverse effects for certain slow-growing invertebrates associated with complex benthic habitat. While the latter effects would be long term in duration, they would be localized and would recover over time without mitigation; therefore, these adverse effects would be **minor** adverse.

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

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

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

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

Noise: Construction-related sources of sound pressure and vibration that could affect invertebrates are impact and vibratory pile driving, construction vessels and HRG surveys, and UXO detonation. In general, mollusks and crustaceans are less sensitive to noise-related injury than many fish because they lack internal air spaces and are therefore less vulnerable to sound pressure injuries on internal organs than vertebrates (Popper et al. 2001). Most invertebrates are insensitive to hearing injury as they lack the specialized organ systems evolved by vertebrates to sense sound pressure (Popper et al. 2001). Current research suggests that some invertebrate species groups, such as cephalopods (e.g., octopus, squid), crustaceans (e.g., crabs, shrimp), and some bivalves (e.g., Atlantic scallop, Atlantic surfclam, ocean quahog) are capable of sensing sound through particle motion (Andre et al. 2011; Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014). Particle motion effects dissipate rapidly and are highly localized around the noise source, with detectable effects on invertebrates typically limited to within 3 to 6 feet of the source (Edmonds et al. 2016; Payne et al. 2007). Non-impulsive noise sources like vessel engines are less likely to produce behavioral effects in invertebrates.

While these conclusions reflect current knowledge, considerable uncertainty remains about sound sensitivity in some invertebrates. For example, squid exposed to 2 hours of continuous noise pulses ranging from 157 to 175 dB re 1 µPa displayed damage to specialized sensory cells used for balance and orientation (Andre et al. 2011). More recently, Jones et al. (2020, 2021) determined that longfin squid, an EFH species, can likely sense and exhibit behavioral responses to vibration from impact pile driving transmitted through sediments, potentially at a greater distance from the source, perhaps several hundred feet. They theorized that intense particle motion exposure could have indirect effects (e.g., impaired ability to detect predators or prey) on squid. These findings suggest that squid could experience injury or behavioral effects from intense underwater noise exposure, but evidence for this type of effect is limited and additional research is needed.

Assuming that bivalves, crustaceans, and other benthic invertebrates could detect and respond to particle motion effects from impact pile driving within 16.4 feet of the outer surface of each of the Project foundations. The available research indicates that invertebrates are similarly insensitive to UXO detonation, meaning that only those invertebrates within a short distance from the blast impact footprint would be able to detect the associated particle motion effects. Impact pile driving and UXO detonation would take place in areas previously or subsequently disturbed during seabed preparation, respectively, meaning that these impacts would overlap but would occur at different periods in time. Particle motion effects from pile driving would be limited to short-term behavioral responses, most likely lasting for the duration of the noise impact and limited periods (minutes to hours) following exposure. Particle motion effects from UXO detonation could result in mortality of organisms on the munition and within the blast area, and short-term behavioral responses at greater distance. Impacts of this magnitude would constitute a **minor** adverse effect on invertebrates. Noise generated by construction vessels and HRG survey activities are of much lower intensity (Denes et al. 2021; LGL Ecological Research Associates [LGL] 2022), with behavioral-level effects on invertebrates likely limited to within 7 feet of a continuously

mobile noise source. Only pelagic invertebrates like squid would be likely to detect these effects as the HRG equipment is operated well above the seafloor. HRG survey effects are therefore likely to be **negligible** adverse.

Underwater noise could also affect invertebrate eggs and larvae. Popper et al. (2014) summarized available research on the sensitivity of finfish to underwater noise effects. They recommended thresholds for lethal injury and temporary threshold shift (TTS) effects by fish hearing group, including fish eggs and larvae, which are summarized in Table 3.6-7. The applicability of the fish egg and larvae threshold to invertebrate eggs and larvae is unclear, but it is used here to estimate the range of potential effects. Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment. As shown in Table 3.13-1 in Section 3.13.2.2.1 (noise effects on finfish), impact pile driving and UXO detonation are the only noise sources with the potential to affect invertebrate eggs and larvae. Eggs and larvae within approximately 1,680 and 3,458 feet of WTG and OSS monopile installation, respectively, could be injured or killed by cumulative exposure to impact pile-driving noise. BOEM anticipates that several UXOs could be identified within the RWF and/or RWEC corridor during preconstruction surveys. Orsted anticipates that up to 13 UXOs, ranging from 5 to 1,000 pounds in size, may need to be detonated in place. The actual number and location of UXOs is not currently known, but the largest devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek, Inc. [Ordtek] 2021). UXO detonation could kill eggs and larvae within tens to thousands of feet depending on the size of the device. Keevin and Hempen (1997) examined these effects and determined that setbacks of 49, 213, and 656 feet would protect eggs and larvae from detonation effects for 1.1-, 22-, and 220-pound devices, respectively. Extrapolating from this relationship, the setback requirement to protect eggs and larvae from a 1,000-pound UXO, the largest device anticipated in the maximum work area (Hannay and Zykov 2021; LGL 2022), is approximately 1,385 feet (see Table 3.13-2, Section 3.13.2.2.1). These findings indicate that impact pile driving and UXO detonation are likely to cause mortality-level effects on some invertebrate eggs and larvae. However, these adverse impacts are likely to be **minor** overall because 1) the areas of effect are small relative to the available habitat, and 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae, which can range from 1% to 10% per day or higher (White et al. 2014).

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

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

Note: N/A = not applicable.

* Thresholds from Popper et al. (2014).

† Values in dB re 1 µPa, except where indicated.

‡ Values in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second.

¥ Particle acceleration exposure threshold (Popper et al. 2014).

§ Threshold from Fisheries Hydroacoustic Working Group (2008).

Juvenile and adult invertebrates are generally insensitive to sound pressure and can only detect the particle motion component of sound, or the vibration of the surrounding water column and sediments in immediate proximity to a sound source. Detectable particle motion effects on invertebrates are typically limited to within 7 feet (2 m) of the source or less (Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014; Payne et al. 2007). Vibration from impact pile driving can also be transmitted through sediments. Recent research (Jones et al. 2020, 2021) indicate that longfin squid, an EFH species, can sense and respond to vibrations from impact pile driving at a greater distance based on sound exposure experiments. This in turn suggests that infaunal organisms, such as clams, worms, and amphipods, could exhibit a behavioral response to vibration effects over a larger area, but additional research is needed to confirm these effects and their biological significance. Particle motion effects could theoretically cause injury and/or mortality to invertebrates in a limited area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The affected areas would likely be recolonized in the short term, and the overall impact on invertebrates would be **minor** adverse.

Presence of structures: Invertebrates within the benthic disturbance footprints for foundation installation, described in Section 3.6.2.2.1, could be exposed to crushing and burial effects. Some individual invertebrates would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. The time required for recovery would vary depending on the type of habitats

affected, ranging from short term for invertebrates found in soft-bottom habitats to long term for invertebrates associated with large-grained complex and complex habitats. Therefore, adverse effects to invertebrates from construction of structures would be **minor** adverse.

Sediment deposition and burial: The Project conducted a model-based analysis of the anticipated extent and magnitude of suspended sediment impacts on water quality and benthic habitats in COP Appendix J (RPS 2021). This analysis considered impacts from jet plow trenching for IAC and OSS-link cable installation, jet-plow trenching and dredging used to install the RWEC, and dredging associated with sea-to-shore transition construction. It determined that suspended sediments released into the water column would be rapidly dispersed by tidal currents, settling back to the seafloor within minutes to hours of the disturbance. The majority of water column effects would be limited to short-term TSS pulses below 100 mg/L. Higher TSS concentrations exceeding 100 mg/L would occur in areas where seafloor sediments have a greater proportion of mud and silt. TSS plumes caused by construction disturbance would dissipate quickly, with concentrations above 100 mg/L lasting no longer than 6 hours at any location (RPS 2021). A summary of the anticipated extent of water column TSS and substrate burial effects is provided in Table 3.6-8.

Suspended sediments will resettle on the seafloor, blanketing the existing habitat with layers of fine sediment of varying thickness. Fine sediment deposition from IAC construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) on up to 3,152 and 9,538 acres, respectively. Burial depths from OSS-link cable construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) on up to 302 and 1,374 acres, respectively. Burial depths from RWEC construction could exceed 0.4 inch (10 mm) and 0.004 inch (0.1 mm) over 3,285 and 12,138 acres, respectively. Burial effects on invertebrates would be short term in duration, lasting for minutes to hours after initial bed disturbance as suspended sediments resettle on the seafloor. The actual area of effect at a given moment during construction would be limited to the seafloor disturbance footprint within and adjacent to cable installation activities and the deposition zone downcurrent of the disturbance. IAC and OSS-link cable installation impacts would occur intermittently over a 5-month construction window while the RWEC installation would occur continuously over a period of approximately 8 months. Impacts from other activities like anchoring and boulder relocation were not modeled but are likely to be similar in magnitude but reduced in extent per unit mile of activity relative to jet plow trenching and dredging. These impacts would occur prior to cable installation, meaning that this IPF would produce sequential impacts on some benthic habitats.

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

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

Project Element	Location	Length (miles)	0.004 inch (acres)	0.04 inch (acres)	0.4 inch (acres)	50 mg/L (feet)	100 mg/L (feet)
Inter-array cable*	OCS	155.3	35,798	22,715	217	1,209	932
OSS-link cable‡	OCS	9.3	1,444	918	9	1,209	932
RWEC #1 and #2, seafloor preparation	OCS	16.8	5,760	2,539	1,078	4,494	3,067
	State	3.2	13,107	6,035	2,066	6,888	5,838
RWEC #1 and #2, installation‡	OCS	37.3	5,787	3,681	35	1,542	1,476
	State	46.0	8,035	4,672	0	3,764	2,345
Sea-to-shore transition	State	N/A	35	20	7	1,460	1,312

* RPS (2021) did not estimate deposition acreage for the entire IAC. Sediment deposition and burial effects for IAC installation were estimated for this EIS based on the modeled deposition acreage per mile for IAC, OSS-link cable, and RWEC segments for different substrate classifications reported by Inspire Environmental (2021), and the proportional distribution of IAC segments by substrate classification. . Values are averages of modeled results for two different tidal current regimes.

‡ RPS (2021) modeled TSS impact estimates for RWEC #1 and the OSS-link cable combined. OSS-link cable values are estimated using the modeled deposition rate/mile for comparable substrate classes in the RWEC footprint. RWEC deposition area results are two times the RPS (2021) results for RWEC #1 minus the estimated OSS-link cable deposition area, assuming that RWEC #2 impacts will be similar to those from RWEC #1 based on proximity and routing through similar benthic habitat types.

† The RPS (2021) model scenario assumed excavation and backfill of a combined 5,881 cubic yards of sediment at the HDD exit pit using a backhoe excavator and venturi eductor device.

3.6.2.3.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

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

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

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

Table 3.6-9. Survey Methods

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

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

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

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

The Proposed Action includes EPMs to minimize EMF impacts. The Project will employ HVAC transmission, which generally produces lower intensity EMFs than HVDC. All transmission cables would be contained in grounded metallic shielding to minimize electrical field effects and buried to target depths

of 4 to 6 feet (1.2 to 1.8 m) or deeper in soft-bottom benthic habitat and other areas where burial is possible. Cable segments that cross unavoidable hard substrates and other offshore infrastructure would be laid on the bed surface covered with a concrete mattress or other form of cable armoring for protection. EMF effects in these areas would be greater than for buried cable segments. EMF levels diminish rapidly with distance and would become indistinguishable from baseline conditions within about 26 feet (8 m) of both buried and exposed cable segments (Exponent 2021). Modeled EMF effects for buried and exposed cable segments under annual average and peak transmission loads are summarized in Table 3.6-10.

Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried and exposed electrical transmission cables on the surrounding environment. They determined that heat from exposed cable segments would dissipate rapidly without measurably heating the underlying sediments. In contrast, the typical HVAC cable buried in sand and mixed sand and mud (i.e., soft-bottom benthic habitat) can heat sediments within 1.3 to 2 feet (0.4 to 0.6 m) of the cable surface by +10 to 20 degrees Celsius (°C). Substrate heating effects are also summarized in Table 3.6-10.

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

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

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

* Value ranges shown are modeled effects under average and peak load conditions, estimated as 66 kV at 480 and 685 amps, respectively, for the IAC cable (Exponent 2021).

† Value ranges shown are modeled effects under average and peak load conditions, estimated as 275 kV at 690 and 985 amps, respectively, for the RWEC and OSS-link cables (Exponent 2021).

The evidence for EMF effects on invertebrates is equivocal, varying considerably between species and based on the type and strength of EMF source (Albert et al. 2020; Hutchison et al. 2020b). Several studies have observed no apparent behavioral responses in crustaceans and mollusks at EMF field strengths similar to the highest levels likely to result from IAC, OSS-link cable, and RWEC segments laid on the bed surface. A handful of studies have observed apparent physiological effects on clams, mussels, and worms after a few hours of exposure to EMF levels within the ranges shown in Table 3.6-10, while other studies have observed no apparent effects on the same types of organisms from much higher exposures over longer periods. These contradictions are compounded by differences in study methods and the type of EMF exposure (i.e., HVDC versus HVAC transmission), making it difficult to draw conclusions about the sensitivity of benthic invertebrates to EMF effects (Hutchison et al. 2020b). Given this uncertainty, the potential permanent effects from Project-related EMFs on invertebrates that live in or directly on the seafloor could range from **negligible** to **minor** adverse.

While directed studies are lacking, there is little evidence that cephalopods like squid are sensitive to EMFs, even at exposure levels similar to the highest potential levels likely to result from the Proposed Action (Love et al. 2015; Normandeau et al. 2011; Williamson 1995). The available evidence suggests that EMFs from the Project would have **negligible** adverse effects on invertebrates like longfin and shortfin squid, both EFH species.

In addition to EMF effects, buried segments of the IAC would generate sufficient heat to raise the temperature of the surrounding sediments by as much as 10 to 20°C above ambient temperatures within 1.3 to 2 feet (0.4 to 0.6 m) of buried cable segments (see Table 3.6-10). Temperature changes of this magnitude could adversely affect Atlantic surfclam and ocean quahog (Acquafredda et al. 2019; Harding et al. 2008) as well as other benthic infauna species. However, the amount of suitable habitat exposed to these effects would be limited. Cable burial at 4 to 6 feet (1.2 to 1.8 m) would limit substrate heating effects to depths 2 feet or more below the bed surface, below the depths inhabited by most invertebrate species. Cable segments at the transitions between fully buried and exposed cable segments would be at shallower depths, potentially exposing quahog and surfclam habitat and other invertebrate infauna species habitat to adverse thermal effects. However, these habitats would also be covered by concrete mattresses, meaning that the affected habitats would no longer be available to these species. On this basis, substrate heating impacts, while permanent, would have a **negligible** adverse effect on invertebrates.

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

Noise: The RWF WTGs would generate permanent operational noise effects throughout the life of the Project, ending when the Project is decommissioned. The Project would employ current generation direct-drive WTG designs that generally produce less underwater noise and vibration than older generation WTGs with gearboxes. Much of our current understanding about operational noise is based on the monitoring of wind farms in Europe that use these older generation designs. Although useful for generally characterizing

potential noise effects, these data are necessarily representative of the noise produced by current generation designs (Elliot et al. 2019; Tougaard et al. 2020). Typical noise levels produced by older generation geared WTGs range from 110 to 130 dB re 1 µPa with 1/3-octave bands in the 12.5- to 500-Hz range, sometimes louder under extreme operating conditions (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020).

Monitoring of operational noise produced by the BIWF (Elliot et al. 2019) supports the conclusion that modern WTG designs generally produce less noise than older generation models. The BIWF employs five 6-MW direct-drive WTGs. Operational noise from these WTGs was generally lower than noise levels generated by older, lower capacity WTGs at European wind farms as reported in the literature (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020). Operational noise levels typically ranged from 110 to 125 re 1 µPa, occasionally reaching as high as 128 dB re 1 µPa, mostly at low frequencies ranging from 10 Hz to 8 kHz. Particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. These values are considered usefully representative of the underwater noise effects likely to result from RWF operations. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10-MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects could be more intense and extensive than those considered herein, but additional research is needed to confirm this hypothesis.

Invertebrates lack specialized hearing organs and cannot sense sound pressure in the same way as fish and other vertebrates. Invertebrates can sense sound as particle motion, but particle motion effects dissipate rapidly and are usually undetectable within a few feet of the source. Certain species, specifically squid, may be more sensitive to sound than invertebrates as a group. However, the sound pressure and particle motion effects observed at the BIWF are well below levels associated with injury and behavioral responses in invertebrates and unlikely to cause measurable effects on these species. Moreover, the rapid development of benthic invertebrate communities on operational wind farms worldwide (see Presence of structures below) indicates that operational noise has little if any effect on invertebrates. Collectively, this information indicates that operational noise effects on invertebrates would be **negligible** adverse.

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

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

Habitat for invertebrates that colonize hard surfaces or associate with complex benthic habitat would increase. Epibenthic organisms (e.g., mussels and anemones) and crustaceans that prefer hard-bottom

habitat (e.g., American lobster and crab) would gain habitat. The available evidence indicates that recovery of benthic habitat structure would begin quickly and would likely be relatively rapid, but full recovery of the community of habitat-forming organisms could take a decade or more. For example, Degraer et al. (2020) have documented the development of diverse invertebrate communities on offshore wind structures around the globe. Hutchison et al. (2020a) documented the development of a diverse and biologically productive invertebrate community that developed on turbine foundations at the nearby BIWF within 3 years after construction. The structures were initially colonized by dense aggregations of mussels and barnacles, followed by corals, hydroids, anemones, and predatory invertebrates like crabs, sea stars, and snails. An invasive tunicate, already widespread and common in the region, is also present. Shell hash and detritus falling from the foundations changed the composition of and enriched the surrounding sediments, increasing biological productivity. These effects extended beyond the scour protection footprint surrounding each foundation. Similar artificial reef effects have been observed at other offshore wind facilities (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). While these findings indicate relatively rapid recovery of benthic community structure in general, some impacts may be longer lasting. Certain types of habitat-forming invertebrates, such as sponges and corals, are sensitive to disturbance and slow growing. These more sensitive species can take decades to fully recover and recolonize damaged habitats (Tamsett et al. 2010). Based on the proximity of RWF structures to the BIWF, it is reasonable to conclude that RWF structures would develop a similarly diverse biological community over a similarly short period. While benthic organisms colonized the BIWF relatively quickly, it could take a decade or more before damaged and newly introduced hard surfaces achieve full habitat function (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). Offshore wind structures could in theory provide a foothold for harmful nonnative species invasions. Nonnative species have been observed at the BIWF and other wind farms (Degraer et al. 2020; Hutchison et al. 2020c), but negative impacts on native biological communities have yet to be demonstrated (Degraer et al. 2020).

In general, reef effects are likely increase the diversity and biological productivity of the invertebrate community within and around the RWF over time (Causon and Gill 2018). The resulting effects on invertebrates would vary by species and could be positive, negative, or neutral depending on a variety of factors. For example, the displacement of soft-bottom benthic habitat would constitute a limited but permanent **moderate** adverse impact on invertebrates that use this habitat type. Some of these negative effects could be offset by organic enrichment and increased biological productivity in soft-bottom habitats at the edge of the reef effect zone (e.g., Hutchison et al. 2020c). Invertebrate species that associate with hard substrates and vertical relief created in the water column would gain new opportunities for habitat colonization that would otherwise not be present in the offshore environment. These beneficial effects could vary depending on the structures involved. For example, concrete mattresses used for cable protection at the BIWF did not show measurable invertebrate community growth at 3 years following installation (HDR 2020), indicating that this type of structure will take longer to develop functional habitat value.

Hydrodynamic effects resulting from the presence of offshore wind structures could also affect the distribution and abundance of invertebrates within and around the RWF. As discussed in Section 3.6.1.2.1, a hydrodynamic modeling study conducted for BOEM (Johnson et al. 2021) has determined that the planned introduction of offshore wind energy structures to the RI/MA and MA WEAs would likely lead to small but measurable changes in current speed, wave height, and sediment transport in the

northern Mid-Atlantic Bight. These hydrodynamic effects are in turn likely to influence the dispersal of planktonic invertebrate and fish larvae within the WEAs and their surroundings, increasing larval settlement in some areas and decreasing it in others (Johnson et al. 2021). Changing larval dispersal pathways can disrupt connectivity between populations and the processes of larval settlement and recruitment (Sinclair 1988). Large-scale hydrodynamic changes can create population "sinks," or subpopulations that are reproductively isolated from other regional populations by unfavorable changes in larval dispersal (Sinclair 1988).

While some hydrodynamic effects on larval dispersal patterns are likely to occur, and these impacts would last until the Project is decommissioned, the full development of the RWF would be unlikely to cause adverse population-level effects on any invertebrate species. The species of the region are broadly distributed, supported by numerous spawning locations from which larvae are dispersed over broad distances along a southwesterly gradient consistent with regional circulation patterns (Chen et al. 2021; McCay et al. 2011; Munroe et al. 2018; Roarty et al. 2020; Zhang et al. 2015). While the Johnson et al. (2021) modeling results indicate that Project-related shifts in larval transport and settlement density are likely to occur, their findings indicate that any such effects would be localized and unlikely to lead to the development of significant population sinks. These findings indicate that hydrodynamic impacts from the RFW are unlikely to lead to broader scale changes in invertebrate population viability or community composition. As such, the hydrodynamic impacts of the Proposed Action would constitute a **minor** adverse effect on invertebrates. These impacts would cease when the Project is decommissioned, and subpopulation distribution would shift in response to the oceanographic conditions present at that time as determined by climate change and other regional trends.

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

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

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

TSSs into the water column. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

3.6.2.3.3 Cumulative Impacts

Offshore Activities and Facilities

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

When the Project is combined with other future offshore wind projects, up to approximately 19 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTGs and the OSSs' within the invertebrate GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and marine debris would be required of RWF Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and impacts would be minimized through planned EPMs and other mitigation measures detailed in Tables F-1 and F-2, respectively, in Appendix F. Impacts to invertebrates, including habitat-forming species, from small-volume spills are therefore expected to be **negligible** adverse and short term in duration.

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

Anchoring and new cable emplacement/maintenance: BOEM estimates a cumulative total of 5,850 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the invertebrate GAA. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover.

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

Bycatch: As discussed under O&M, the Proposed Action includes implementation of a FRMP to evaluate the effects of Project construction and structure presence on economically valuable fish and shellfish resources (Revolution Wind and Inspire Environmental 2021). Other planned and potential future offshore wind energy projects have or will likely implement similar monitoring plans that employ similar sampling methods using commercial fishing gear. These monitoring programs have and will likely

continue to contract with commercial fishers to conduct data collection. The commercial fishers involved would likely otherwise be engaged in commercial fishing activity, meaning that planned and future monitoring activities are unlikely to increase the amount of fishing effort and associated impacts on invertebrates in the GAA relative to existing conditions. However, the distribution and timing of those impacts may change. As such, cumulative impacts from bycatch associated with monitoring activities under the Proposed Action in combination with other planned and future offshore wind projects would be **negligible** to **minor** adverse, with the impacts ranging from short term to long term in duration. Long-term impacts could result from damage to habitat-forming invertebrates in large-grained complex and complex benthic habitat and would also constitute an impact to benthic habitat structure.

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

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

EMF: Under the Proposed Action the Project would generate EMF and substrate heating effects of varying intensity along the combined 252 miles of IAC, OSS-link cable, and RWEC length. These effects would combine with those generated by the 10,024 miles of transmission cables from other future offshore wind facilities and existing transmission cables present within the invertebrate GAA. These cumulative effects would be similar in nature to those described for the No Action Alternative in Section 3.6.1.1.1. In summary, measurable effects on invertebrates from EMF exposure would be limited to individuals that occur in the immediate proximity (i.e., within 20 feet) of Project cables and range from short-term changes in behavior with no significant long-term consequences to potential physiological changes with prolonged exposure. Substrate heating effects could render small amounts of habitat unsuitable for certain benthic invertebrate species at locations where buried cables are within 2 feet of the bed surface. Effects to individuals are unlikely to have a measurable impact on any invertebrate species at the population level and would therefore range from negligible to minor adverse depending on the type of exposure. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC (versus HVDC) transmission and apply similar design measures to those included in the Proposed Action avoid and minimize EMF effects on the environment. While uncertainties remain, cumulative adverse impacts to invertebrates from EMF and substrate heating effects resulting from past, planned, and potential future actions are likely to be **minor** adverse.

Light: The Proposed Action would result in noticeable but negligible adverse impacts to invertebrates through the installation of up to 102 lighted structures (100 WTGs and two OSSs). The Proposed Action and all future projects would be expected to comply with BOEM design guidance for avoiding and

minimizing adverse lighting impacts on the environment (BOEM 2021), meaning that effects to invertebrates would be negligible and adverse. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse, mostly attributable to existing, ongoing activities.

Noise: The Proposed Action would generate underwater noise effects during Project construction, throughout the operational life of the Project, and during Project decommissioning. These effects would combine with similar effects resulting from the construction, O&M, and decommissioning of other planned offshore wind projects on the mid-Atlantic OCS. As stated previously, invertebrates are relatively insensitive to underwater noise and are unlikely to detect or exhibit measurable responses operational noise and vibration from the Project. Invertebrates in close proximity to impact and vibratory pile-driving activities could be temporarily disturbed by vibration effects, but any such effects would be short term in duration and are unlikely to have a measurable effect on any invertebrate population at the scale of the GAA. On this basis, cumulative effects on invertebrates resulting from underwater noise caused by the Proposed Action are likely to be **negligible** to **minor** adverse, varying by species.

Presence of structures: The Proposed Action would result in long-term alteration of water column and seafloor habitats, resulting in a diversity of effects on benthic habitat and invertebrates, including EFH species. The 102 monopile foundations and other hard surfaces installed as part of the Proposed Action would create an artificial reef effect. The new offshore structures would also cause hydrodynamic effects that would influence primary and secondary productivity within and around the artificial reef and effects on planktonic invertebrates, eggs, and larvae. Reef effects would alter biological community structure, producing an array of effects on invertebrates. Those cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** adverse and beneficial to **moderate** adverse and beneficial in terms of overall impact.

The Proposed Action is comparable in scale compared to some of the offshore renewable energy projects planned in the GAA. BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,110 WTG and OSS foundations within the invertebrate GAA. Many of these projects will or could be developed in adjacent lease areas. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential impacts of these broader cumulative effects on invertebrates in general.

Sediment deposition and burial: The Proposed Action would result in localized short-term **minor** adverse sediment deposition and burial effects on benthic habitat and invertebrates. Short-term burial effects exceeding 10 mm would occur over an estimated 3,285 acres within the invertebrate GAA. Similar sediment deposition and burial impacts would result from the estimated 25,082 cumulative acres of cabling-related disturbance for the Proposed Action plus other future offshore wind projects within the invertebrate GAA. While suspended sediment effects from future projects cannot be predicted without area-specific modeling, these effects are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. Some future projects could include dredging for O&M facility development or related port improvements. When combined with other past, present, and

reasonably foreseeable actions, the Proposed Action would result in **minor** adverse cumulative impacts on benthic habitats and invertebrates.

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

3.6.2.3.4 Conclusions

The construction and installation, O&M, and decommissioning of the Proposed Action would impact invertebrates through several mechanisms, including direct disturbance and mortality from seafloor disturbance during construction, entrainment of eggs and larvae, permanent habitat conversion, and changes in invertebrate community structure and food web interactions caused by reef effects. Reef effects would occur on and around RWF foundations and on portions of the RWEC corridor where cable protection would create new biological hotspots that would benefit some invertebrate species and reduce habitat suitability for others. Benthic infauna and other relatively immobile invertebrates within the 6,632-acre overall disturbance footprint of the Project would unavoidably be injured or killed during Project construction. This impact alone constitutes a moderate adverse effect on benthic habitat. These adverse effects would be offset by moderate beneficial effects to some invertebrate species that benefit from the reef effects formed by new offshore structures.

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

3.6.2.4 Alternatives C, D, E, and F: Benthic Habitat

3.6.2.4.1 Construction and Installation

Offshore Activities and Facilities

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

While Alternatives C through F would noticeably reduce the extent of adverse impacts to benthic habitat relative to the Proposed Action, the general scale, nature, and duration of impacts are broadly comparable to those described for the Proposed Action and would therefore be **minor** adverse, applying the impact criteria defined in Section 3.3, Table 3.3-2. However, these criteria do not fully capture the benefits of avoiding long-term impacts to specific habitat types. For example, Alternative C emphasizes avoiding and minimizing impacts to complex benthic habitat and reducing the overall impact footprint. This alternative would reduce benthic habitat impacts from 6,615 acres to 4,374 to 4,440 acres, depending on the configuration selected. Impacts to large-grained complex and complex benthic habitat would decrease from an estimated 2,057 acres to 1,443 to 1,469 acres, depending on configuration. Impacts to these habitat types would be long term to permanent in duration. The proposed configurations of Alternative E would produce a similar reduction in impacts to large-grained complex and complex benthic habitat to 1,223 to 1,461 acres, depending on configuration. While these two alternatives would produce comparable reductions in overall impact footprint, the proposed configurations of Alternative C were developed to avoid impacts to specific habitats of particular value for certain fish species. The distribution of WTG and OSS foundations relative to large-grained complex and complex habitats under the proposed configurations of Alternative C are shown in Appendix L, Figures L-2 and L-3. The differences between alternatives in terms of impacts to habitat suitability for fish species of concern are addressed in greater detail in Section 3.13.2.4.1.

Anchoring and cable installation impacts from Alternative D are broadly similar but noticeably reduced in extent compared to the Proposed Action. The various configurations of Alternative D would reduce the overall benthic habitat impact footprint by 559 to 959 acres relative to the Proposed Action, while the distribution of impacts by habitat type would remain nearly the same (see Table 3.6-11). However, because this alternative would selectively remove rows of WTG foundations from the perimeter of the RWF, it would not avoid impacts to the high-value large-grained complex and complex habitats in the center of the Lease Area to the same degree as Alternative C.

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

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

Alternative	Maximum Construction Disturbance Footprint (acres)*	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	6,615	7.2%	23.9%	68.9%
C1	4,440	6.7%	24.4%	68.8%
C2	4,374	8.1%	24.9%	67.0%

* Estimated maximum extent of seafloor disturbance, accounting for overlapping impacts occurring at different points in time. IAC configurations for Alternatives C through E have not been developed. Therefore, the benthic habitat impacts presented for Alternative C are based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts and are presented here for comparison to impacts from Alternatives D and E. IAC impacts for these alternatives are based on the same assumption.

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

Alternative	Maximum Construction Disturbance Footprint (acres)*	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	6,615	7.2%	23.9%	68.9%
D1	6,056	7.8%	23.2%	69.0%
D2	5,855	7.9%	23.6%	68.4%
D3	5,656	7.8%	24.6%	67.6%
D1+D2	5,709	7.9%	22.6%	69.5%
D1+D3	5,972	7.8%	23.6%	68.7%
D2+D3	5,740	7.9%	24.0%	68.1%
D1+D2+D3	5,809	7.9%	23.0%	69.1%

* Estimated maximum extent of seafloor disturbance, accounting for overlapping impacts occurring at different points in time. IAC configurations for Alternatives C through E have not been developed. Therefore, the benthic habitat impacts presented for Alternative C are based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts and are presented here for comparison to impacts from Alternatives C and E. IAC impacts for these alternatives are based on the same assumption.

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

Alternative	Maximum Construction Disturbance Footprint (acres)*	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	6,614	7.2%	23.9%	68.9%
E1	4,548	4.0%	22.9%	73.1%
E2	5,332	4.4%	23.0%	72.6%

* Estimated maximum extent of seafloor disturbance, accounting for overlapping impacts occurring at different points in time. IAC configurations for Alternatives C through E have not been developed. Therefore, the benthic habitat impacts presented for Alternative C are based on a hypothetical configuration that underestimates the likely extent and distribution of benthic habitat impacts and are presented here for comparison to impacts from Alternatives C and D.

Presence of structures: Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action, resulting in a noticeable reduction in the extent of construction-related impacts on benthic habitat composition and structure. Specifically, seafloor preparation impacts would decrease from approximately 731 acres under the Proposed Action to between 475 and 682 acres depending on the Alternatives C through F configuration evaluated.

Differences in the extent of benthic habitat impacts between the Proposed Action and alternate configurations of Alternatives C through E are shown by construction element in Table 3.6-14, Table 3.6-15, and Table 3.6-16. As shown, each configuration would result in seafloor preparation impacts on varying amounts of soft-bottom, complex, and large-grained complex habitat, producing short- to long-term or permanent effects on benthic habitat composition and long-term to permanent effects on benthic habitat structure that extend beyond the footprint of the installed structures.

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

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

Alternative	Seafloor Preparation Footprint (acres)*	Monopile Foundations and Scour Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	734	81.6	19.0%	29.7%	51.3%
C1	482	53.6	10.7%	21.4%	68.0%
C2	475	52.8	12.8%	21.4%	65.8%

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

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

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

Alternative	Seafloor Preparation Footprint (acres)*	Monopile Foundations and Scour Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	734	81.6	19.0%	29.7%	51.3%
D1	684	76.0	20.0%	25.9%	54.1%
D2	677	75.2	20.2%	28.4%	51.4%
D3	684	76.0	19.7%	31.3%	49.0%
D1+D2	626	69.6	21.4%	24.1%	54.4%
D1+D3	634	70.4	20.9%	27.3%	51.8%
D2+D3	626	69.6	21.1%	30.1%	48.8%
D1+D2+D3	576	64.0	22.5%	25.6%	52.0%

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

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

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

Alternative	Seafloor Preparation Footprint (acres)*	Monopile Foundations and Scour Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	734	81.6	19.0%	29.7%	51.3%
E1	475	52.8	22.6%	39.5%	37.9%
E2	598	66.4	21.7%	34.7%	43.6%

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

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

3.6.2.4.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

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

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

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

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

Alternative	Wind Turbine Generator and Offshore Substation Foundations (total number)	Maximum Seafloor Footprint Occupied by Foundations (acres)*	Cable Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	102	74.5	146.4	18.7%	26.6%	54.7%
C1	67	48.9	108.3	10.7%	21.4%	68.0%
C2	66	48.2	106.1	12.8%	21.4%	65.8%

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Cable protection would be placed in complex benthic habitat along 10% of cable length on the OCS and 19.5% of cable length in state waters, totaling 74.1 acres for the IAC, 4.4 acres for the OSS-link cable, and 41.8 acres for the RWEC routes under the Proposed Action.

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

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

Alternative	Wind Turbine Generator and Offshore Substation Foundations (total number)	Maximum Seafloor Footprint Occupied by Foundations (acres)*	Cable Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	102	74.5	146.4	18.7%	26.6%	54.7%
D1	95	69.4	134.5	20.8%	22.4%	56.8%
D2	96	68.6	133.5	19.4%	25.3%	55.4%
D3	95	69.4	133.6	19.1%	27.9%	53.0%
D1+D2	89	63.5	129.6	19.9%	22.6%	57.5%
D1+D3	88	64.3	126.3	19.6%	25.6%	54.8%
D2+D3	89	63.5	130.2	23.3%	23.5%	53.2%
D1+D2+D3	82	58.4	130.1	20.9%	24.1%	55.0%

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively, and within the cable installation corridors. Cable protection would most likely be required along 10% of cable length on the OCS and along 19.5% of cable length in state waters, totaling 66.7 acres for the IAC, 3.8 acres for the OSS-link cable, and 41.8 acres for the RWEC routes under the Proposed Action. Cable protection acreage varies between Transit Alternative configurations based on IAC length.

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

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

Alternative	Wind Turbine Generator and Offshore Substation Foundations (total number)	Maximum Seafloor Footprint Occupied by Foundations (acres)*	Cable Protection (acres)†	Large-Grained Complex (%)	Complex (%)	Soft Bottom (%)
Proposed Action	102	74.5	146.4	18.7%	26.6%	54.7%
E1	66	48.2	111.5	23.2%	33.0%	43.8%
E2	83	60.1	121.2	21.3%	30.1%	48.6%

* The habitat composition shown is based on the mapped habitat composition within monopile and scour protection footprints of 0.03 and 0.7 acre and 0.04 and 0.7 acre for the WTG and OSS foundations, respectively. Cable protection would be placed in complex benthic habitat along 10% of the cable length, totaling 74.1 acres for the IAC, 4.4 acres for the OSS-link cable, and 41.8 acres for the RWEC routes under the Proposed Action. Cable protection acreage would vary between alternative configurations based on IAC length and elimination of the OSS-link cable and RWEC #2 under E1 and E2.

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

3.6.2.4.3 Conclusions

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

3.6.2.5 Alternatives C, D, E, and F: Invertebrates

3.6.2.5.1 Construction and Installation

Offshore Activities and Facilities

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

exposed to noise and vibration effects would vary between alternatives depending on the configuration selected.

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

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

Type of Noise Exposure	Activity	Threshold Distance (feet)*	Exposure Parameter	Proposed Action (number)	C1 (number)	C2 (number)
Potentially lethal effects on eggs and larvae	Foundation installation	~16	No. of sites	102	66	67
			Total days	35	23	23
	UXO detonation	49–1,385[†]	No. of sites	13 (estimated)[‡]		
Behavioral effects on subadults and adults	Foundation installation	6–16[§]	No. of sites	102	66	67
			Total days	35	23	23
	HRG survey	6	Linear miles	10,755		
			Total days	248		
	UXO detonation	6–16[§]	No. of sites	13 (estimated)[‡]		

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

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

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

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

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

Type of Noise Exposure	Activity	Threshold Distance (feet)*	Exposure Parameter	Number by Alternative							
				Proposed Action	D1	D2	D3	D1+ D2	D1+ D3	D2+ D3	D1+ D2+ D3
Potentially lethal effects on eggs and larvae	Foundation installation	~16	No. of sites	102	95	94	95	87	88	87	80
			Total days	35	33	33	33	30	31	30	28
	UXO detonation	49–1,385[†]	No. of sites	13 (estimated)[‡]							
Behavioral effects on subadults and adults	Foundation installation	6–16[§]	No. of sites	102	95	94	95	87	88	87	80
			Total days	35	33	33	33	30	31	30	28
	HRG survey	6	Linear miles	10,755							
			Total days	248							
	UXO detonation	6–16[§]	No. of sites	13 (estimated)[‡]							

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

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

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

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

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

Type of Noise Exposure	Activity	Threshold Distance (feet)*	Exposure Parameter	Number by Alternative		
				Proposed Action	E1	E2
Potentially lethal effects on eggs and larvae	Foundation installation	~16	No. of sites	102	66	83
			Total days	35	23	29
	UXO detonation	148–1,385†	No. of sites	13 (estimated)‡		
Behavioral effects on subadults and adults	Foundation installation	6–16§	No. of sites	102	66	83
			Total days	35	23	29
	HRG survey	6	Linear miles	10,755		
			Total days	248		
	UXO detonation	6–16§	No. of sites	13 (estimated)‡		

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

† The range of safety setbacks derived from Keevan and Hempen (1997) for explosive devices range from 5 to 1,000 pounds, based on the range of device sizes likely to occur in the maximum work area (LGL 2022). UXO detonation impacts could occur anywhere within a 114,769-acre area within the RWF and/or along the RWEC corridor.

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

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

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

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

As shown, the various configurations of Alternatives C through F would modify the installation length for the IAC. This would reduce the extent of sediment deposition and burial effects for IAC installation relative to the Proposed Action. The Habitat Alternative would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitat, meaning that invertebrates associated with those habitats would be less likely to experience deposition effects. As

currently designed, Alternatives C through F would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would be similar to those produced by the Proposed Action. While these alternatives would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, the level of impact would be the same as under the Proposed Action. Therefore, short-term sediment deposition and burial effects on invertebrates would range from **negligible** to **minor** adverse.

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

Component	Proposed Action (acres)	C1 (acres)	C2 (acres)
IAC	217	113	113
OSS-link cable	9	9	9
RWEC	3,724	3,724	3,724

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

Component	Proposed Action	D1 (acres)	D2 (acres)	D3 (acres)	D1+D2 (acres)	D1+D3 (acres)	D2+D3 (acres)	D1+D2+ D3 (acres)
IAC	217	184	182	183	171	172	170	159
OSS-link cable	9	9	9	9	9	9	9	9
RWEC	3,724	3,724	3,724	3,724	3,724	3,724	3,724	3,724

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

Component	Proposed Action (acres)	E1 (acres)	E2 (acres)
IAC	217	122	147
OSS-link cable	9	9	9
RWEC	3,724	3,724	3,724

3.6.2.5.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

EMF: Alternatives C through F would result in similar EMF impacts on invertebrates to those described in Section 3.6.2.3.2 for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the configuration selected. Modeled magnetic and induced electrical field effects for buried and exposed cable segments are described in Section 3.6.2.3.2. As shown, these

effects vary in magnitude depending on whether the cable is buried to a minimum depth of 3.3 feet (1 m) or is laid on the bed surface under protective armoring. Differences in potential EMF exposure between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.6-26, Table 3.6-27, and Table 3.6-28 in terms of the differences in the total length of buried versus exposed cable segments. While the linear extent of cable-generated EMF effects would decrease, the resulting adverse effects would be of the same intensity and general geographic scale as those produced by the Proposed Alternative, ranging from **negligible** to **minor** adverse.

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

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

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

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

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

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

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

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

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

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

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

3.6.2.5.3 Conclusions

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

3.6.2.6 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix F, Table F-2 and addressed here in more detail (Table 3.6-29). This list of mitigation measures is subject to change following the completion of cooperating agency review.

Table 3.6-29. Proposed Mitigation Measures – Benthic Habitat and Invertebrates

Mitigation Measure	Description	Effect
Anchoring plan	BOEM would require Revolution Wind to develop an anchoring plan to avoid minimize adverse impacts on benthic habitat during Project construction and from O&M activities throughout the life of the Project.	The anchoring plan would delineate sensitive large-grained complex and complex habitats, including eelgrass and kelp beds, and identify areas where anchoring activities are restricted. The anchoring plan would effectively minimize long-term impacts to large-grained complex and complex habitats, limiting the extent of long-term impacts on habitat-forming invertebrates and benthic habitat structure. While anchoring impacts to these resources would remain minor overall, the duration of most impacts would be reduced to short term as the majority would occur in soft-bottomed habitats.

Mitigation Measure	Description	Effect
Scour and cable protection	Revolution Wind would be required to use natural rounded stone for cable and scour protection within large-grained complex and complex habitats and avoid use of concrete mattresses where practicable. The selected materials should be designed and placed to restore three-dimensional structural complexity.	This measure would reduce impacts on benthic habitat composition and structural complexity and, in the case of cable protection, reduce the time required for colonization by habitat-forming organisms. While long-term impacts from these structures would remain the same, moderate adverse to moderate beneficial, the time required to achieve moderate beneficial effects would decrease.
Post-installation cable monitoring	Revolution Wind would be required to inspect all cables after construction is completed to document exact location, burial depth, and post-installation benthic habitat conditions. Inspections would be completed within 6 months of Project commissioning, annually for the first 3 years following construction, and as needed following major storm events. Monitoring reports would be submitted to BOEM within 45 days of survey completion.	This measure would not result in a change in impact determination for benthic habitat or invertebrates but would contribute to an improved understanding of the nature and duration of these impacts.
Sound field verification	Revolution Wind would develop a sound field verification plan and submit it to BOEM, the USACE, and NMFS for review and written approval at least 90 days prior to initiating underwater noise-producing construction activities.	This measure would not modify the impact determination for noise effects on invertebrates (negligible) but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

3.7 Birds

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

3.8 Coastal Habitats and Fauna

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

3.9 Commercial Fisheries and For-Hire Recreational Fishing

3.9.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Commercial Fisheries and For-Hire Recreational Fishing

Geographic analysis area: The GAA for commercial fisheries and for-hire recreational fishing is composed of the waters managed by the New England Fishery Management Council and/or the Mid-Atlantic Fisheries Management Council within the U.S. Exclusive Economic Zone (from 3 to 200 nm from the coastline), plus all of the state waters (from 0 to 3 nm from the coastline) of Rhode Island as shown in Figure 3.9-1.

Affected environment:

Commercial Fisheries: This analysis focuses on commercial fishing activity in the Lease Area and a 1,640-feet wide corridor centered along the RWEC. The primary source of data was summarized vessel trip report (VTR) data provided by NMFS in two separate batches: 1) data summarizing U.S. Atlantic coastwide landings and revenues (NMFS 2021a); and 2) landings and revenue data specific to areas directly associated with the Project (NMFS 2022). The summarized VTR data include catch estimates by fishing location combined with NMFS estimates of revenue using ex-vessel price data drawn from commercial fisheries dealer reports. Other sources of catch and effort data were the webpages at NMFS (2021b) and NMFS (2021c), which contain commercial fisheries data for each proposed WEA on the U.S. Atlantic coast. In addition, the analysis includes 1) figures showing the directionality of VMS-enabled fishing vessels that were developed by BOEM based on data provided by NMFS (2019), and 2) figures showing the distribution of fishing revenue intensity that were adapted from maps in NMFS (2020).

To understand the relative importance of the Lease Area and RWEC corridor to fisheries in the New England and Mid-Atlantic regions, the commercial fishing revenue sourced from each area is compared to the total commercial fishing revenue reported by the NMFS Greater Atlantic Regional Fisheries Office for federally permitted commercial fishing activity in the New England and Mid-Atlantic regions. These two regions include all coastal states from Maine to North Carolina. In addition, to provide a more localized geographical context the analysis describes commercial fishing revenue in the Regional Fisheries Area (RFA) for the Project, which includes Greater Atlantic Region Statistical Areas 537, 538, 539, 611, and 612. The description of commercial fishing in the RFA also includes a discussion of the area of high value fisheries that was excluded by BOEM from possible leasing for wind energy development in order to reduce conflict with both commercial and recreational fishing activities.

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

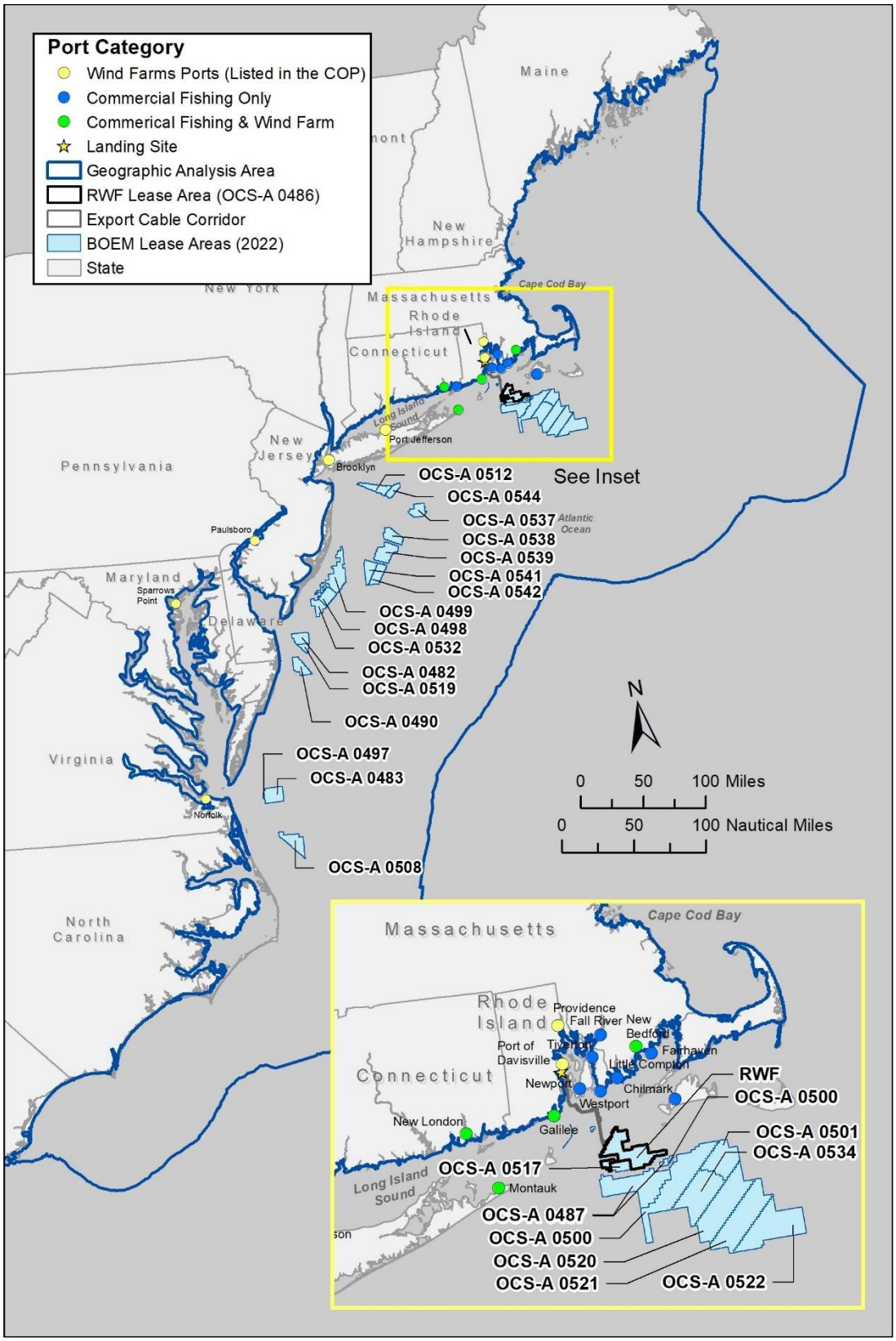


Figure 3.9-1. Geographic analysis area for commercial fisheries.

New England and Mid-Atlantic Regional Setting

Commercial fisheries operating in federal waters off the Mid-Atlantic and New England regions are known for large catches of a variety of species, including Atlantic herring, clams, squid, sea scallops, skates, summer flounder, groundfish, monkfish, lobster, and Jonah crab. These fishery resources are harvested with a broad assortment of fishing gear, including mobile gear (e.g., bottom trawl, dredge, and midwater trawl) and fixed gear (e.g., gillnet, pot, bottom longline, seine, and hand line). The fishery resources are managed under several FMPs, including the Sea Scallop FMP, Monkfish FMP, Northeast Multispecies (large- and small-mesh) FMP,[15] Skate FMP, Atlantic Herring FMP, and Red Crab FMP (NEFMC 2022); Surfclam/Ocean Quahog FMP, Mackerel/Squid/Butterfish FMP, Spiny Dogfish FMP, Bluefish FMP, Golden and Blueline Tilefish FMP, Summer Flounder/Scup/Black Sea Bass FMP, and River Herring FMP (MAFMC 2021); Highly Migratory Species FMP (NMFS 2021e); and Lobster FMP and Jonah Crab FMP (Atlantic States Marine Fisheries Commission [ASMFC] 2021).[16] These FMP fisheries are referred to frequently throughout the EIS, and therefore the author-date citations are provided here at first mention only.

One way that fishery resources contribute to regional economies is through direct ex-vessel revenue or through revenue generated when a commercial fishing boat lands or unloads a catch. Table 3.9-1 shows the average annual revenue by FMP fishery (sorted alphabetically) from 2008 through 2019, the time period for which the most recent data are available. Although there is substantial variability in the year-to-year harvest of various species, on average, federally permitted commercial fishing activity generated approximately $952.4 million in average revenue annually from 2008 through 2019, with the Sea Scallop FMP accounting for more than half (54%) of the total while the American Lobster FMP fishery accounted for 10% and Northeast Multispecies (large-mesh) FMP fishery accounted for 8% of the total. The row labeled “Other FMPs, non-disclosed species, and non-FMP fisheries” comprised 10% of the total average annual revenue.[17]

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

[16] The regional setting includes the jurisdictions of two regional fishery management councils created under the Magnuson-Stevens Fishery Conservation and Management Act: the Mid-Atlantic Fishery Management Council (MAFMC) manages fisheries in federal waters off the coasts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, and the NEFMC manages fisheries in federal waters off the coasts of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The two councils manage species with many FMPs that are frequently updated, revised, and amended, and they coordinate with each other to jointly manage species across jurisdictional boundaries. Some of the managed fisheries of each council extend into state waters. Therefore, the councils work with the ASMFC, which comprises the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states’ marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and the NMFS under the framework of the ASMFC (ASMFC 2021).

[17] This row includes revenues from the three federal FMP fisheries1) Surfclam/Ocean Quahog, 2) Red Crab, and 3) River Herring. In addition, this row includes data for species from listed FMPs that could not be disclosed due to confidentiality rules, and revenues from federally permitted vessels operating in other fisheries that are not federally managed. NMFS cannot disclose data to the public unless it includes information from three or more vessels and three or more dealers/buyers. Also note that data for the Surfclam/Ocean Quahog FMP fishery is included in this row in spite of its relatively high annual average value ($60.0 million) for reasons of consistency—revenues for the FMP fishery could not be reported for any of the other RWF-related tables.

Table 3.9-1. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Fishery Management Plan (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)
American Lobster	$117,251.0	$93,250.1
Atlantic Herring	$32,856.3	$25,929.7
Bluefish	$1,820.4	$1,275.3
Golden and Blueline Tilefish	$6,583.4	$5,553.9
Highly Migratory Species	$4,008.4	$2,219.4
Jonah Crab	$17,082.7	$9,607.8
Mackerel, Squid, and Butterfish	$74,576.6	$51,911.7
Monkfish	$28,943.7	$20,597.3
Northeast Multispecies (large-mesh)	$105,418.2	$73,331.4
Northeast Multispecies (small-mesh)	$13,499.5	$11,261.1
Sea Scallop	$661,233.5	$518,891.6
Skates	$10,217.1	$7,448.4
Spiny Dogfish	$5,237.2	$2,975.4
Summer Flounder, Scup, Black Sea Bass	$45,205.7	$39,807.4
Surfclam, Ocean Quahog	$63,152.0	$60,087.2
Other FMPs, non-disclosed species and non-FMP fisheries*	$33,646.8	$28,290.4
All FMP and non-FMP fisheries	$1,132,912.7	$952,438.3

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table 3.9-2 shows the average annual landings by individual species from 2008 through 2019. Atlantic herring and sea scallops accounted for 41% and 13% of the total landings, respectively, while Loligo squid and skates each accounted for 6%.

Table 3.9-2. Commercial Fishing Landings (pounds) of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Species (2008–2019)

Species	FMP Fishery	Peak Annual Landings (pounds)	Average Annual Landings (pounds)
Atlantic herring	Atlantic Herring	217,820,607	155,541,858
Skates	Skates	26,811,281	21,310,278
Silver hake	Northeast Multispecies (small-mesh)	17,316,860	14,078,640
Scup	Summer Flounder, Scup, Black Sea Bass	14,551,815	10,859,288
Loligo squid	Mackerel, Squid, and Butterfish	38,654,405	24,653,366
Atlantic mackerel	Mackerel, Squid, and Butterfish	48,873,977	18,789,264
Monkfish	Monkfish	12,188,795	9,732,966
Spiny dogfish	Spiny Dogfish	22,843,386	13,376,198
American lobster	American Lobster	22,227,430	19,334,031
Jonah crab	Jonah Crab	17,874,506	11,855,186
Red hake	Northeast Multispecies (small-mesh)	1,908,985	1,357,856
Summer flounder	Summer Flounder, Scup, Black Sea Bass	14,999,293	9,289,256
Butterfish	Mackerel, Squid, and Butterfish	7,852,044	3,242,538
Sea scallops	Sea Scallop	59,057,105	49,948,027
Bluefish	Bluefish	2,886,624	1,825,725
Yellowtail flounder	Northeast Multispecies (large-mesh)	3,915,379	2,172,206
Cod	Northeast Multispecies (large-mesh)	16,920,601	7,477,847
Black sea bass	Summer Flounder, Scup, Black Sea Bass	3,093,459	1,806,872
Winter flounder	Northeast Multispecies (large-mesh)	5,875,684	3,631,996
Rock crab	No federal FMP	3,707,631	943,811

Source: Developed using data from NMFS (2021a).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC. The order of the species listed reflects the order (from high to low) of pounds landed in the two areas.

Table 3.9-3 shows the average annual revenue by gear type from 2008 through 2019 (sorted alphabetically). Scallop dredge gear accounted for 51% of the revenue generated by all gear in the New England and Mid-Atlantic regions. Bottom trawl gear and pot gear (including pot gear used in the Lobster FMP fishery) also each generated over $115 million in average annual revenue.

Table 3.9-3. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)
Dredge-clam	$65,768.2	$61,333.5
Dredge-scallop	$615,168.5	$489,410.9
Gillnet-sink	$44,624.9	$30,031.6
Handline	$6,222.2	$4,754.5
Pot-other	$146,203.6	$115,055.2
Trawl-bottom	$229,153.5	$187,199.3
Trawl-midwater	$26,600.8	$18,995.8
All other gear*	$62,406.3	$47,305.8
All gear types	$1,135,221.1	$954,086.5

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Commercial fishing fleets are important to coastal communities in the Mid-Atlantic and New England regions because they generate employment and income for vessel owners and crews, as well as create demand for shoreside products and services to maintain vessels and process seafood. In 2017, total seafood landings in the New England and Mid-Atlantic regions, including landings from non-federally permitted vessels, were valued at $1.80 billion. The region is also home to aquaculture production and research that provides employment and business opportunities for coastal communities. In New England, the seafood industry generated $5.6 billion in personal and proprietor income, while that impact totaled $3.8 billion in the Mid-Atlantic (NMFS 2021f).

Table 3.9-4 shows the average annual revenue by port of landing from 2008 through 2019.[18] New Bedford accounted for approximately 40% of the total commercial fishing revenue in the New England and Mid-Atlantic regions, and Cape May and Narragansett/Point Judith accounted for 9% and 5%, respectively.

[18] The ports shown are the 15 ports (or port groups) that had disclosed revenue and landings data received from NMFS (2022) from within the Lease Area and/or along the RWEC for at least five of the 12 years from 2008 through 2019.

Table 3.9-4. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries and Level of Fishing Dependence by Port

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Commercial Fishing Engagement Categorical Ranking*	Commercial Fishing Reliance Categorical Ranking†
Point Judith, RI	$58,531.0	$46,076.7	High	Medium
New Bedford, MA	$458,246.7	$378,792.6	High	Medium
Little Compton, RI	$3,007.4	$1,992.2	Medium	Medium
Westport, MA	$1,905.8	$1,305.2	Low	Low
Newport, RI	$16,111.1	$8,896.3	High	Low
Chilmark/Menemsha, MA‡	$656.1	$470.9	Medium	High
Fairhaven, MA	$17,395.3	$11,282.5	High	Low
Montauk, NY	$24,549.9	$18,496.4	High	Medium
Fall River, MA	*$5,123.6*	*$1,135.6*	*Medium*	*Low*
Tiverton, RI	$1,603.1	$1,148.8	Medium	Low
Other Ports, MA	$120,161.5	$105,383.0	N/A	N/A
Point Pleasant, NJ	$37,321.9	$30,986.2	Low	Low
Newport News, VA	$54,540.1	$30,970.8	High	Low
Beaufort, NC	$5,210.8	$2,654.1	High	Medium
Hampton, VA	$19,482.0	$14,379.2	High	Low

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Commercial Fishing Engagement Categorical Ranking*	Commercial Fishing Reliance Categorical Ranking†
Other New England/Mid-Atlantic ports§	$377,510.8	$299,651.2	–	–
All New England/Mid-Atlantic Ports	$1,135,221.1	$953,621.7	–	–

Source: NEFMC (2021); NMFS (2021a)

Notes: Commercial fishing revenue data are from 2008 through 2019; levels of fishing dependency are for 2018. Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the total row. Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates.

* Commercial fishing engagement measures the presence of commercial fishing through fishing activity as shown through permits, fish dealers, and vessel landings. A high rank indicates more engagement. N/A indicates that no information is available.

† Commercial fishing reliance measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance. N/A indicates that no information is available.

‡ Reported landings are divided evenly between the two communities.

§ Includes all other ports that had landings from federally permitted vessels fishing in the New England and Mid-Atlantic regions.

Table 3.9-4 also presents the level of commercial fishing engagement and reliance of the community in which the port is located. These rankings portray the level of dependence the community has on commercial fishing. As shown in the table, the rankings differ across communities, with Cape May ranking high for both commercial fishing engagement and reliance, and Westport and Point Pleasant ranking low for the two indices. Information regarding how the rankings were determined for each community is provided in the community profiles available at NEMFC (2021). These profiles present the most recent data available for key indicators for New England and Mid-Atlantic fishing communities related to dependence on fisheries and other economic and demographic characteristics. Selected socioeconomic characteristics of communities with fishing ports that could be affected by the Project are also presented in Section 3.11 and Section 3.12.

Regional Fisheries Area

The Lease Area and RWEC are located in the RFA, which, as noted above and shown in Figure 3.9-2, includes Greater Atlantic Region Statistical Areas 537, 538, 539, 611, and 612.

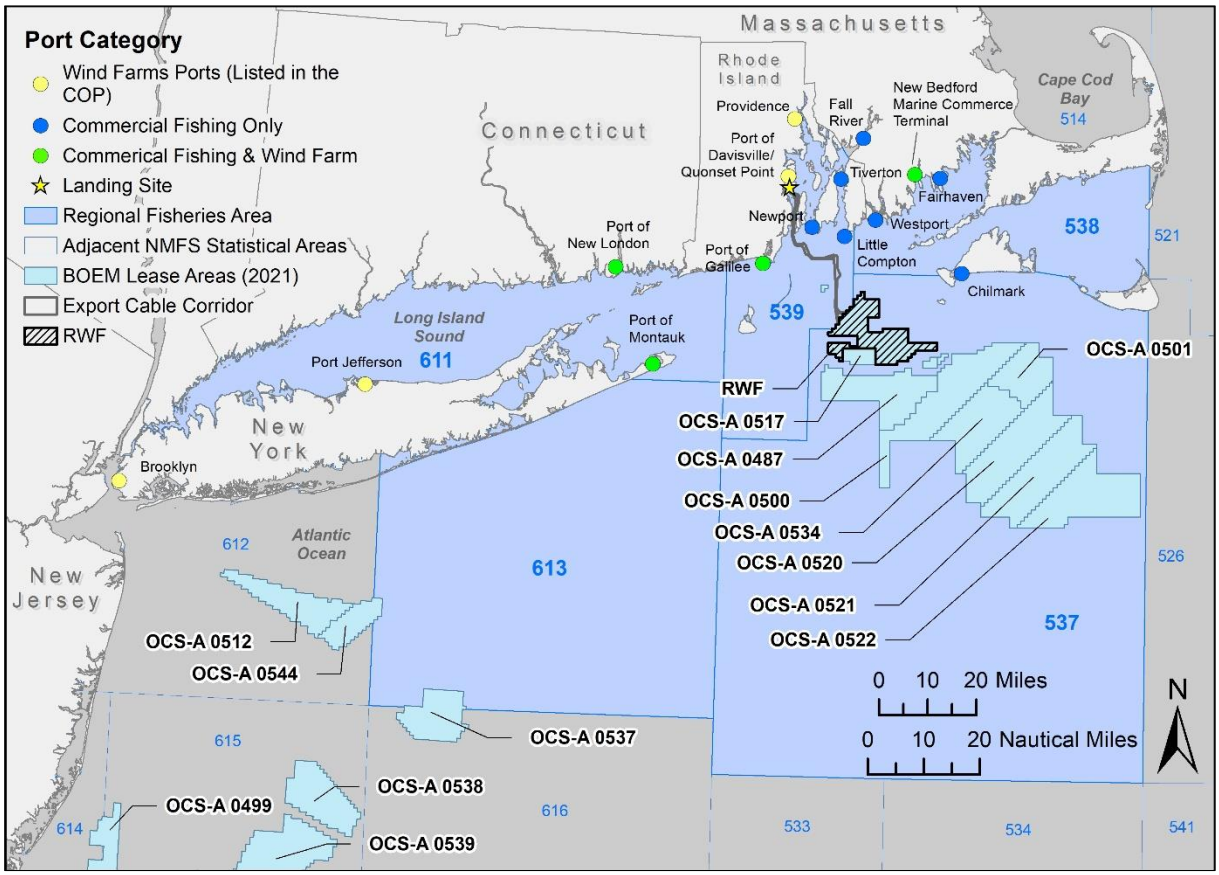


Figure 3.9-2. Regional Fisheries Area.

Table 3.9-5 shows the average annual revenue in the RFA by FMP fishery from 2008 through 2019. On average, federally permitted commercial fishing activity in the RFA annually generated $143.9 million in revenue, with the Sea Scallop FMP fisheries accounting for 35% of the total, while the Mackerel, Squid, and Butterfish FMP fishery accounted for 11% and the Summer Flounder, Scup, Black Sea Bass FMP

fishery accounted for 8%. "Other FMPs, non-disclosed species, and non-FMP fisheries" accounted for 23% of the average annual revenue for all FMP and non-FMP Fisheries. Table 3.9-5 also shows the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total revenue of the Jonah Crab FMP fishery (61%), Skate FMP fishery (48%), Bluefish FMP fishery (46%), and Monkfish FMP fishery (36%). Across all FMP and non-FMP fisheries the RFA accounted for approximately 15% of the total revenue in the Mid-Atlantic and New England regions.

Table 3.9-5. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by Fishery Management Plan (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*
American Lobster	$11,498.0	$7,799.0	8.4%
Atlantic Herring	$6,853.8	$2,994.1	11.5%
Bluefish	$816.3	$582.6	45.7%
Highly Migratory Species	$315.5	$219.7	9.9%
Jonah Crab	$11,244.6	$5,871.9	61.1%
Mackerel, Squid, and Butterfish	$29,544.7	$15,424.7	29.7%
Monkfish	$11,610.7	$7,520.2	36.5%
Northeast Multispecies (large-mesh)	$4,616.6	$2,389.4	3.3%
Northeast Multispecies (small-mesh)	$3,928.6	$2,823.6	25.1%
Sea Scallop	$107,023.3	$49,741.2	9.6%
Skates	$5,671.1	$3,579.6	48.1%
Spiny Dogfish	$546.8	$244.0	8.2%
Summer Flounder, Scup, Black Sea Bass	$14,327.2	$10,999.8	27.6%
Other FMPs, non-disclosed species, and non-FMP fisheries†	$42,517.3	$33,757.3	35.9%
All FMP and non-FMP Fisheries	$213,098.9	$143,947.2	15.1%

Source: Developed using NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table 3.9-6 shows the average annual landings by individual species from 2008 through 2019. The top three species were Atlantic herring, skates, and Loligo squid accounting for 27%, 16%, and 12% of the

total landings, respectively. Table 3.9-6 also shows the percentage of each species' total landings in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total landings of rock crab (71%), skates (65%), scup (65%), Jonah crab (54%), red hake (48%), monkfish (44%), Loligo squid (41%), butterfish (38%), and summer flounder (37%).

Table 3.9-6. Commercial Fishing Landings of Federally Permitted Vessels in the Regional Fisheries Area by Species (2008–2019)

Species	FMP Fishery	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions*
Atlantic herring	Atlantic Herring	49,580,526	23,065,828	14.8%
Skates	Skates	15,472,505	13,964,696	65.5%
Silver hake	Northeast Multispecies (small-mesh)	5,527,656	3,557,841	25.3%
Scup	Summer Flounder, Scup, Black Sea Bass	9,912,424	7,105,610	65.4%
Loligo squid	Mackerel, Squid, and Butterfish	21,451,952	10,224,109	41.5%
Atlantic mackerel	Mackerel, Squid, and Butterfish	16,142,814	2,803,012	14.9%
Monkfish	Monkfish	4,975,969	4,302,449	44.2%
Spiny dogfish	Spiny Dogfish	2,168,519	1,061,854	7.9%
American lobster	American Lobster	1,930,635	1,334,642	6.9%
Jonah crab	Jonah Crab	10,396,456	6,372,109	53.7%
Red hake	Northeast Multispecies (small-mesh)	1,030,911	658,114	48.5%
Summer flounder	Summer Flounder, Scup, Black Sea Bass	5,161,839	3,425,527	36.9%
Butterfish	Mackerel, Squid, and Butterfish	2,761,688	1,230,067	37.9%
Sea scallops	Sea Scallop	11,529,926	4,685,271	9.4%
Bluefish	Bluefish	1,000,463	730,175	40.0%
Yellowtail flounder	Northeast Multispecies (large-mesh)	1,032,864	409,308	18.8%
Cod	Northeast Multispecies (large-mesh)	386,358	201,932	2.7%

Species	FMP Fishery	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions*
Black sea bass	Summer Flounder, Scup, Black Sea Bass	944,309	422,898	23.4%
Winter flounder	Northeast Multispecies (large-mesh)	947,933	357,060	9.8%
Rock crab	Other FMPs, non-disclosed species and non-FMP fisheries	3,042,399	667,393	70.7%

Source: Developed using data from NMFS (2021a, 2022).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC. The order of the species listed reflects the order (from high to low) of pounds landed in the two areas.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

Table 3.9-7 shows the average annual revenue in the RFA by gear type the period from 2008 through 2019. Scallop dredge gear accounted for 34% of the revenue generated by all gear types, bottom trawl gear accounted for 30%, and clam dredge gear accounted for 14%. Table 3.9-7 also shows the percentage of each gear type's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total revenue for clam dredge (34%), sink gillnet (32%), handline (29%), and bottom trawl (23%).

Table 3.9-7. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*
Dredge-clam	*$25,562.9*	*$20,831.9*	*34.0%*
Dredge-scallop	$105,678.5	$48,458.7	9.9%
Gillnet-sink	$13,149.3	$9,615.9	32.0%
Handline	$1,673.2	$1,369.0	28.8%
Pot-other	$19,272.8	$16,089.3	14.0%
Trawl-bottom	$60,400.9	$43,039.0	23.0%
Trawl-midwater	$5,373.1	$2,348.8	12.4%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*
All other gear†	$4,061.1	$2,665.0	5.6%
All gear types	$213,098.9	$144,417.7	15.1%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates.

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-8 shows the ports at which fish and shellfish caught in the RFA from 2008 through 2019 were landed. New Bedford and Point Judith together accounted for 53% of the revenue generated by commercial fishing activity in the RFA. Table 3.9-8 also shows the percentage of each port's total revenue in the Mid-Atlantic and New England regions that came from the RFA from 2008 through 2019. The RFA accounted for a large share of the total revenue for Little Compton (97%), Westport (90%), Chilmark/Menemsha (89%), Montauk (64%), Point Judith (60%), and Tiverton (57%).

Table 3.9-8. Commercial Fishing Revenue of Federally Permitted Vessels in the Regional Fisheries Area by Port (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*
Point Judith, RI	$37,052.6	$27,546.5	59.8%
New Bedford, MA	$90,794.6	$48,503.9	12.8%
Little Compton, RI	$2,936.8	$1,940.2	97.4%
Westport, MA	$1,562.6	$1,169.0	89.6%
Newport, RI	$5,302.2	$2,880.8	32.4%
Chilmark/Menemsha, MA	$573.4	$419.6	89.1%
Fairhaven, MA	$4,142.1	$1,439.0	12.8%
Montauk, NY	$16,563.0	$11,859.8	64.1%
Fall River, MA	*$649.8*	*$445.9*	*39.3%*
Tiverton, RI	*$880.0*	*$651.1*	*56.7%*
Other Ports, MA	$8,655.1	$4,875.2	4.7%
Point Pleasant, NJ	$15,019.8	$8,593.3	27.7%
Newport News, VA	$3,587.3	$1,698.9	5.5%

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*
Beaufort, NC	*$2,031.2*	*$862.9*	*32.5%*
Hampton, VA	*$3,478.3*	*$1,562.6*	*10.9%*
Other New England/Mid-Atlantic ports†	$48,508.3	$29,943.3	10.0%
All New England/Mid-Atlantic Ports	$213,098.9	$144,391.8	15.1%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the total row. Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates.

* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

† Includes ports with N/A in the table and other unlisted ports that had landings from federally permitted vessels fishing in the RFA from 2008 through 2019.

In 2010, during the first stage of the public process for BOEM's call for information and nominations to establish the WEA that would eventually become the RI/MA WEA, all of Cox Ledge was included in the area considered for leasing (i.e., call area). However, BOEM held a lengthy stakeholder and scientific review process that identified "high-value" fishing grounds and excluded those areas from the RI/MA WEA (BOEM 2012; Smythe et al. 2016). From 2008 through 2019, the excluded area accounted for approximately 22% of the revenue generated by all fisheries in the call area. It accounted for 32% of the Sea Scallop FMP fishery revenue and 25% of the Monkfish FMP fishery revenue in the call area (NMFS 2021b). For the Sea Scallop and Monkfish FMP fisheries combined, the revenue per square mile in the excluded area was approximately 50% higher than that in the RI/MA WEA in 2007 to 2018 (BOEM 2021a).

Lease Area and Revolution Wind Export Cable

The commercial fisheries that are most active in the Lease Area and along the RWEC encompass a wide range of FMP fisheries, species, gears, and landing ports (Tables 3.9-9 through 3.9-12). An overview of commercial fishing activity in the Lease Area and along the RWEC relative to that in surrounding waters was obtained from figures adapted from information available at NMFS (2020). As shown in Figures G-1 through G-13 in Appendix G, the commercial fishing revenue for most FMP fisheries was at a low level of intensity within the Lease Area and along the RWEC compared to adjacent areas, although occasionally the revenue intensity in some localized spots inside the Lease Area was moderate for the American Lobster, Atlantic Herring, Mackerel, Squid, and Butterfish, Monkfish, and Skate FMP fisheries. In contrast, for some FMP fisheries, including the Monkfish, Skate, and Summer Flounder, Scup, Black Sea Bass FMP fisheries, the revenue intensity levels were high in sizeable expanses of ocean outside the Lease Area and RWEC corridor but within 20 nm of the two areas.

Table 3.9-9 provides additional information on the average annual revenue in the Lease Area by FMP fishery. From 2008 through 2019, an average of 289 federally permitted commercial fishing vessels fished in the Lease Area annually, with a high of 331 vessels in 2008, and a low of 251 vessels in 2018 (NMFS 2021c). On average, federally permitted commercial fishing activity in the Lease Area annually generated $1.06 million in revenue from 2008 through 2019, with the American lobster FMP fishery, Sea Scallop FMP, and Monkfish FMP fishery accounting for 20%, 14%, and 10% of the total, respectively. In

terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the Lease Area from 2008 through 2019, the area accounted for about 1.2% of the Skate FMP fishery's total revenue and approximately 0.5% of the Monkfish FMP fishery's total revenue. In total, the Lease Area accounted for approximately 0.1% of the total revenue across all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions. In terms of the percentage of each FMP fishery's total revenue in the RFA that came from the Lease Area from 2008 through 2019, the area accounted for about 3.8% of the Spiny Dogfish FMP fishery's total revenue, 2.7% of the American Lobster FMP fishery's total revenue, and 2.1% of the Northeast Multispecies (small-mesh) FMP fishery's total revenue. In total, the Lease Area accounted for approximately 0.7% of the total revenue across all FMP and non-FMP fisheries in the RFA. As shown in Table 3.9-9, the Monkfish; Summer Flounder, Scup, Black Sea Bass; and Skate FMP fisheries accounted for the highest number of vessels fishing in the Lease Area. The average annual revenue of vessels fishing in the Lease Area was highest for vessels participating in the Sea Scallop; Atlantic Herring; and American Lobster FMP fisheries.

Table 3.9-9. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by Fishery Management Plan (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†	Average Number of Vessels‡	Average Annual Revenue per Vessel
American Lobster	$364.7	$211.3	0.23%	2.71%	107	$1,972
Atlantic Herring	$144.2	$40.0	0.15%	1.34%	20	$2,009
Bluefish	$4.4	$2.2	0.17%	0.38%	115	$19
Highly Migratory Species	$6.2	$1.3	0.06%	0.60%	28	$47
Jonah Crab	$32.5	$17.8	0.19%	0.30%	51	$353
Mackerel, Squid, and Butterfish	$255.0	$91.8	0.18%	0.59%	114	$802
Monkfish	$202.8	$105.0	0.51%	1.40%	157	$668
Northeast Multispecies (large-mesh)	$105.8	$45.6	0.06%	1.91%	95	$479
Northeast Multispecies (small-mesh)	$138.8	$58.6	0.52%	2.07%	97	$601
Sea Scallop	$405.4	$148.1	0.03%	0.30%	58	$2,553
Skates	$156.9	$90.2	1.21%	2.52%	123	$734
Spiny Dogfish	$22.2	$9.3	0.31%	3.81%	51	$184
Summer Flounder, Scup, Black Sea Bass	$88.5	$46.7	0.12%	0.42%	144	$324

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†	Average Number of Vessels‡	Average Annual Revenue per Vessel
Other FMPs, non-disclosed species, and non-FMP fisheries§	$483.8	$191.1	0.20%	0.57%	N/A	N/A
All FMP and non-FMP Fisheries	$1,339.2	$1,059.0	0.11%	0.74%	289	N/A

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row. N/A indicates that the number cannot be calculated with the available data.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† See Table 3.9-5 for RFA fisheries data by FMP fishery.

‡ The average number of vessels that fished in the Lease Area for "All FMP and non-FMP Fisheries" was calculated based on data in NMFS (2021c).

§ Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring and other FMPs managed by the Southeast Region of NMFS. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

In terms of pounds landed, the top species harvested in the Lease Area were skates (30% of the total landings in the area) and Atlantic herring (27% of the total landings in the area) (Table 3.9-10). The area accounted for about 1.7% of the skate total revenue and 1.4% of the red hake total revenue in the Mid-Atlantic and New England regions and approximately 4.2% of the spiny dogfish total revenue and 3.0% of the skates, silver hake, American lobster, red hake, and cod total revenue in the RFA.

Table 3.9-10. Commercial Fishing Landings of Federally Permitted Vessels in the Lease Area by Species (2008–2019)

Species	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions*	Average Annual Landings as a Percentage of Total Landings in the RFA†
Atlantic herring	1,098,682	325,365	0.21%	1.41%
Skates	681,186	358,490	1.68%	2.57%
Silver hake	252,313	94,308	0.67%	2.65%
Scup	81,771	45,075	0.42%	0.63%
Loligo squid	183,469	57,410	0.23%	0.56%
Atlantic mackerel	693,500	62,883	0.33%	2.24%
Monkfish	132,153	68,060	0.70%	1.58%
Spiny dogfish	95,550	44,507	0.33%	4.19%
American lobster	65,969	40,356	0.21%	3.02%
Jonah crab	41,670	23,907	0.20%	0.38%
Red hake	47,244	19,245	1.42%	2.92%
Summer flounder	31,011	13,533	0.15%	0.40%
Butterfish	28,670	12,523	0.39%	1.02%
Sea scallops	48,945	14,997	0.03%	0.32%
Bluefish	7,436	3,487	0.19%	0.48%
Yellowtail flounder	28,513	6,920	0.32%	1.69%
Cod	19,864	5,913	0.08%	2.93%
Black sea bass	9,995	4,451	0.25%	1.05%
Winter flounder	11,334	4,898	0.13%	1.37%
Rock crab	10,061	3,830	0.41%	0.57%

Source: Developed using data from NMFS (2021a, 2022).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC. The order of the species listed reflects the order (from high to low) of pounds landed in the two areas.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

† See Table 3.9-6 for RFA fisheries data by species.

Data provided in NMFS (2021c) were used to analyze differences in the economic importance of fishing grounds in the Lease Area across commercial fishing operations. These data summarize the number of federally permitted commercial fishing vessels fishing in the Lease Area each year from 2008 through 2019, as well as the percentage of each vessel's annual total fishing revenue that came from within the area. The complete analysis of differences in economic dependency on the Lease Area across vessels is provided in Appendix G. As shown in the appendix, the vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from the lowest to highest percentage and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages, while the fourth quartile represents the highest 25%. In addition, the data provided in NMFS (2021c) reported the number of "outlier" vessels in the distribution of percent of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.

As discussed above, an average of 289 vessels per year fished in the Lease Area from 2008 through 2019. The average annual number of outliers was 40.5 (14% of all vessels), with a high of 47 outliers in 2016 (14.6% of all vessels), and a low of 31 outliers in 2011 (12% of all vessels). From 2008 through 2019, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 12-year period) derived 0.88% of its total revenue from the Lease Area (NMFS 2021c). Of the outliers, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 12-year period from the area. Looking at individual years shown in Figure G-14 in Appendix G, in 2008, one vessel derived nearly 60% of its total revenue from the Lease Area. In that same year, the vessel with the greatest percentage of dependence in the third quartile generated approximately 2.2% of its revenue from the Lease Area. Figure G-14 shows that in any given year the revenue percentage for the majority of outliers were below 10%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

Table 3.9-11 provides the average annual revenue in the Lease Area by gear type from 2008 through 2019. Together, scallop dredge, sink gillnet, bottom trawl, and pot gear accounted for approximately 79% of the total revenue generated by all gear types in the Lease Area. The area accounted for about 0.6% of the sink gillnet gear's total revenue in the Mid-Atlantic and New England regions, and approximately 1.8% of that gear's total revenue in the RFA. About 1.9% of the midwater trawl gear's total revenue in the RFA came from the area.

Table 3.9-11. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
Dredge-clam	*$372.3*	*$111.7*	*0.18%*	*0.54%*
Dredge-scallop	$412.1	$148.7	0.03%	0.31%
Gillnet-sink	$253.3	$169.3	0.56%	1.76%
Handline	$14.6	$2.7	0.06%	0.19%
Pot-other	$389.9	$258.8	0.22%	1.61%
Trawl-bottom	$467.3	$314.7	0.17%	0.73%
Trawl-midwater	*$132.8*	*$43.6*	*0.23%*	*1.86%*
All other gear‡	$268.7	$79.3	0.17%	2.98%
All gear types	$1,339.2	$1,128.8	0.12%	0.78%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the total row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† See Table 3.9-7 for RFA fisheries data by gear type.

‡ Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear, for years when they cannot be disclosed.

Table 3.9-12 shows the ports at which fish and shellfish caught in the Lease Area from 2008 through 2019 were landed. Together, Point Judith, New Bedford, and Little Compton accounted for approximately 79% of the revenue generated by commercial fishing activity in the Lease Area. Little Compton and Westport were the ports most dependent on the Lease Area, with 5.7% and 4.6%, respectively, of their total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the Lease Area, and with 5.9% and 5.2%, respectively, of their total commercial fishing revenue in the RFA derived from the Lease Area.

Table 3.9-12. Commercial Fishing Revenue of Federally Permitted Vessels in the Lease Area by Port (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
Point Judith, RI	$510.2	$379.1	0.82%	1.38%
New Bedford, MA	$530.5	$326.5	0.09%	0.67%
Little Compton, RI	$169.3	$115.0	5.77%	5.93%
Westport, MA	$111.6	$60.6	4.64%	5.18%
Newport, RI	$105.7	$58.7	0.66%	2.04%
Chilmark/Menemsha, MA	$28.2	$16.7	3.55%	3.98%
Fairhaven, MA	*$28.1*	*$14.9*	*0.13%*	*1.03%*
Montauk, NY	$37.1	$16.2	0.09%	0.14%
Fall River, MA	$8.3	ND	ND	ND
Tiverton, RI	$16.7	$7.1	0.61%	1.08%
Other Ports, MA	*$16.5*	*$7.0*	*0.01%*	*0.14%*
Point Pleasant, NJ	*$14.4*	*$4.0*	*0.01%*	*0.05%*
Newport News, VA	*$14.7*	*$3.7*	*0.01%*	*0.22%*
Beaufort, NC	*$4.6*	*$2.3*	*0.09%*	*0.26%*
Hampton, VA	*$7.3*	*$3.4*	*0.02%*	*0.22%*
Other New England/Mid-Atlantic ports‡	$35.3	$20.8	0.01%	0.07%
All New England/Mid-Atlantic Ports	$1,332.7	$1,035.9	0.11%	0.72%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Ports shown in *italics* indicate that fewer than 12 years more than 4 years of data were used to calculate the estimates of average revenue. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

† See Table 3.9-8 for RFA fisheries data by port.

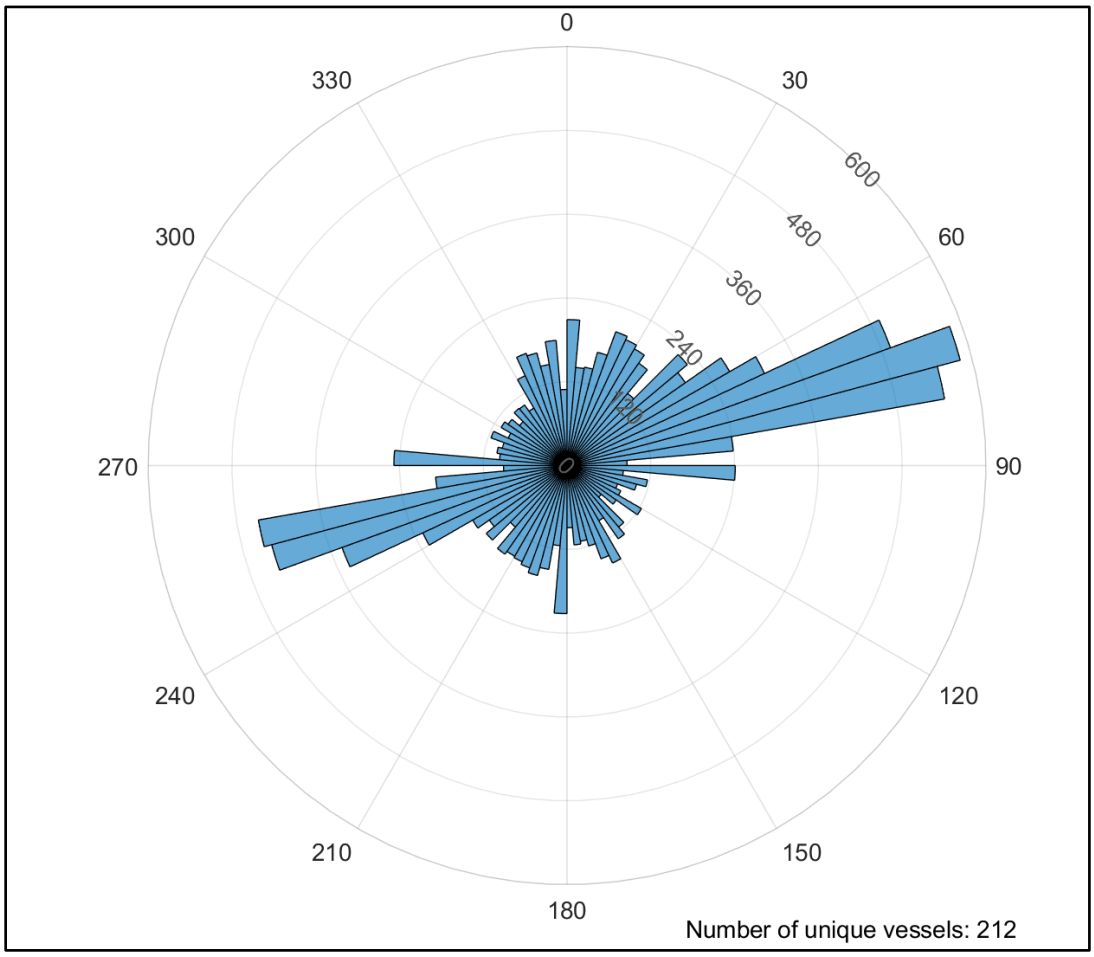
‡ Includes ports with ND in the table and other unlisted ports that had landings from federally permitted vessels fishing from these areas from 2008 through 2019.

The NMFS VMS data are a good source for understanding the spatial distribution of fishing vessels in the Lease Area. As discussed in Appendix G, from 2014 to 2019, vessels with VMS accounted for a substantial portion (90% or greater) of landings in several federally permitted fisheries in the Mid-Atlantic and New England regions, including the Sea Scallop, Monkfish, Atlantic herring, Mackerel/Squid/Butterfish, Northeast Multispecies (large- and small-mesh), Spiny Dogfish, Summer

Flounder/Scup/Black Sea Bass, and Surfclam/Ocean Quahog FMP fisheries. VMS-enabled vessels represented approximately 11% of landings in the Lobster and 14 % in the Jonah Crab FMP fisheries (NMFS 2019).

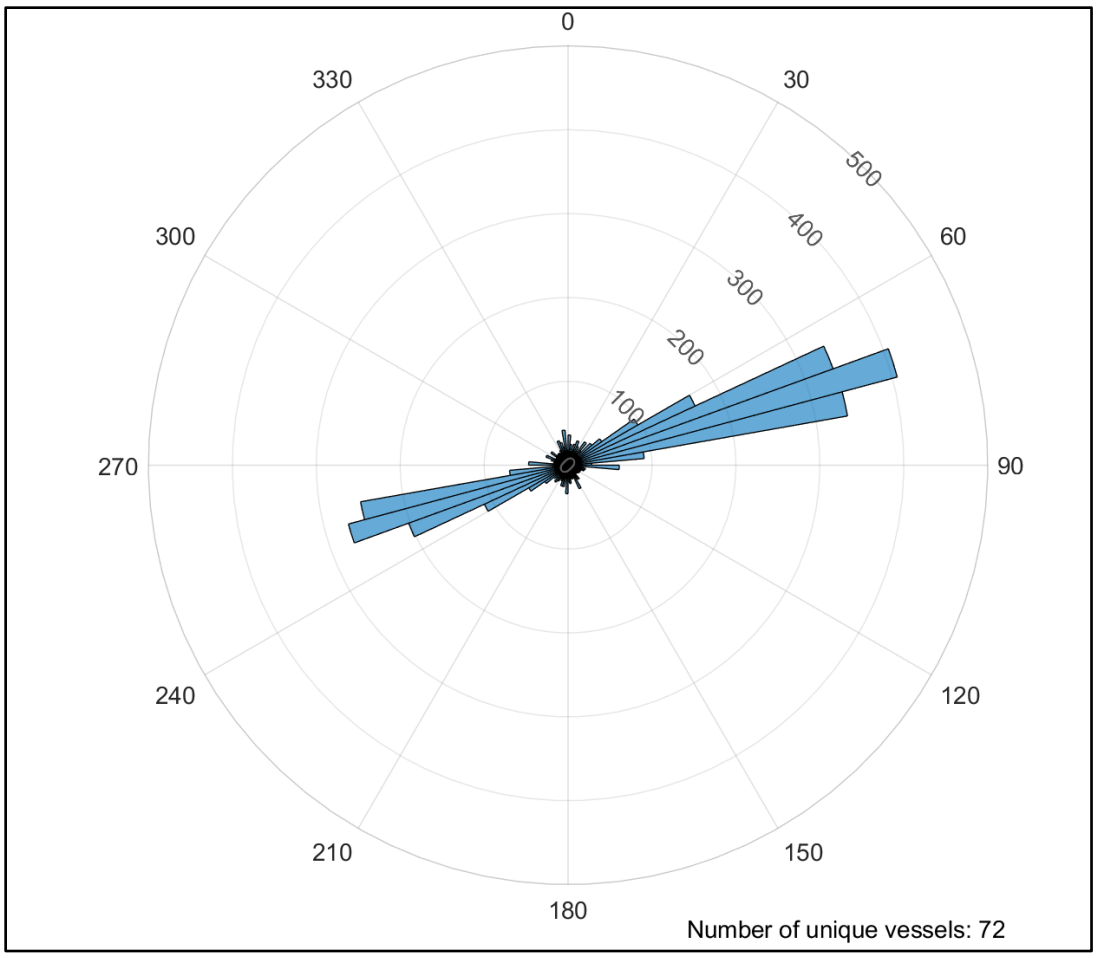
Based on data provided by NMFS (2019), polar histograms (Figure 3.9-3 through Figure 3.9-5) showing the directionality of VMS-enabled vessels fishing in the Lease Area were developed using the information conveyed in individual position reports (pings) from January 2014 to August 2019. Vessels moving at speeds less than 5 knots were assumed to be actively fishing. The larger bars in the polar histograms represent a greater number of position reports showing fishing vessels moving in a certain direction within the RI/MA WEA. The polar histograms differ with respect to their scales.

Figure 3.9-3 shows that most of the 212 unique vessels participating in FMP fisheries in the Lease Area followed a northeast–southwest fishing pattern. As shown in Figure 3.9-4, most of the 72 unique vessels participating in non-VMS fisheries in the Lease Area followed a similar fishing pattern. Figure 3.9-5 shows that the orientation of vessels fishing within the Lease Area varied by FMP fishery.



Source: Developed by BOEM using VMS data provided by NMFS (2019).

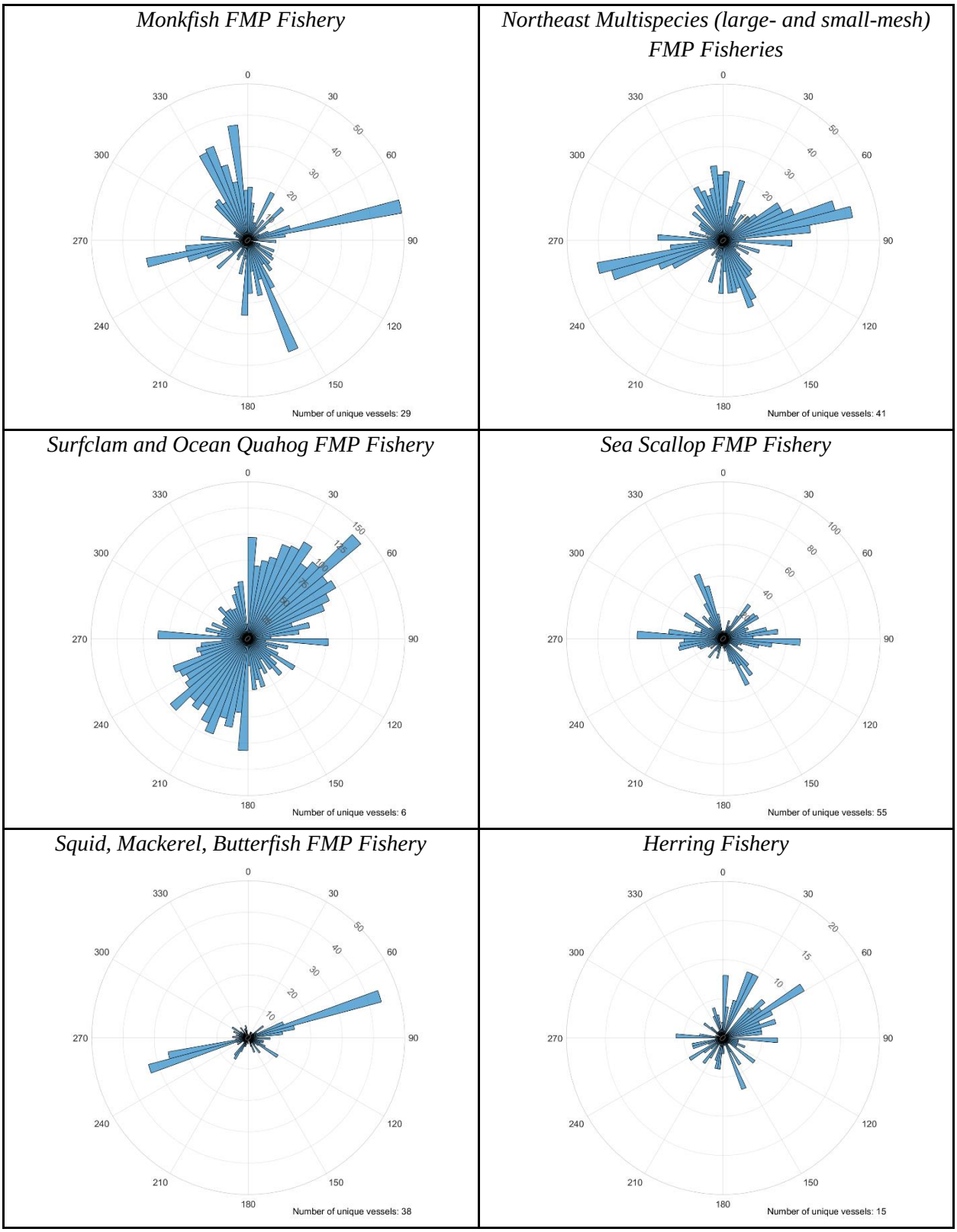
Figure 3.9-3. Vessel monitoring system bearings of vessels actively fishing within the Lease Area, all fishery management plan fisheries combined, January 2014 to August 2019.



Notes: These are fishing vessels that are transmitting VMS data after having declared themselves as participating in a fishery that does not require VMS transmissions.

Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.9-4. Vessel monitoring system bearings of vessels actively fishing within the Lease Area, non–vessel monitoring system fisheries, January 2014 to August 2019.



Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.9-5. Vessel monitoring system bearings of vessels actively fishing within the Lease Area by fishery management plan fishery, January 2014 to August 2019.

Table 3.9-13 presents the average annual revenue in the corridor along the RWEC by FMP fishery from 2008 through 2019. On average, federally permitted commercial fishing activity along the RWEC annually generated $359.7 thousand in revenue, with the American Lobster FMP fishery, Atlantic Herring FMP fishery, and Mackerel, Squid, and Butterfish FMP fishery accounting for 20%, 17%, and 15% of the total revenue, respectively. In terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the RWEC corridor from 2008 through 2019, the area accounted for about 0.5% of the Bluefish FMP fishery's total revenue, 0.3% of the Skate FMP fishery's total revenue, and 0.2% of the Atlantic Herring FMP fishery's and Spiny Dogfish FMP fishery's total revenue. In total, the RWEC corridor accounted for approximately 0.04% of the total revenue across all FMP and non-FMP fisheries in the Mid-Atlantic and New England regions. In terms of the percentage of each FMP fishery's total revenue in the RFA that came from the RWEC corridor from 2008 through 2019, the area accounted for about 2.6% of the Spiny Dogfish FMP fishery's total revenue, 2.1% of the Atlantic Herring FMP fishery's total revenue, and 1.1% of the Bluefish FMP fishery's total revenue. In total, the RWEC corridor accounted for approximately 0.25% of the total revenue across all FMP and non-FMP fisheries in the RFA.

Table 3.9-13. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by Fishery Management Plan Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
American Lobster	$143.1	$72.5	0.08%	0.93%
Atlantic Herring	$179.5	$62.9	0.24%	2.10%
Bluefish	$12.8	$6.5	0.51%	1.12%
Highly Migratory Species	$1.8	$0.9	0.04%	0.40%
Jonah Crab	$9.9	$5.3	0.06%	0.09%
Mackerel, Squid, and Butterfish	$112.3	$53.5	0.10%	0.35%
Monkfish	$8.6	$4.9	0.02%	0.07%
Northeast Multispecies (large-mesh)	$11.7	$6.9	0.01%	0.29%
Northeast Multispecies (small-mesh)	$54.4	$15.7	0.14%	0.56%
Sea Scallop	$20.7	$9.0	0.00%	0.02%
Skates	$46.1	$20.6	0.28%	0.57%
Spiny Dogfish	$16.0	$6.4	0.22%	2.64%
Summer Flounder, Scup, Black Sea Bass	$48.0	$37.5	0.09%	0.34%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
Other FMPs, non-disclosed species, and non-FMP fisheries‡	$101.9	$56.9	0.06%	0.17%
All FMP and non-FMP Fisheries	$519.7	$359.7	0.04%	0.25%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* See Table 3.9-1 for Mid-Atlantic and New England fisheries data by FMP fishery.

† See Table 3.9-5 for RFA fisheries data by FMP fishery.

‡ Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

In terms of pounds landed, the top species harvested along the RWEC were Atlantic herring (60% of the total landings in the area) and skates (15% of the total landings in the area (Table 3.9-14). The area along the RWEC accounted for about 0.59% of the skates total revenue and 0.44% of the scup total revenue in the Mid-Atlantic and New England regions, and approximately 2.3% of the spiny dogfish and Atlantic herring total revenue in the RFA.

Table 3.9-14. Commercial Fishing Landings of Federally Permitted Vessels along the Revolution Wind Export Cable by Species (2008–2019)

Species	FMP	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions*	Average Annual Landings as a Percentage of Total Landings in the RFA†
Atlantic herring	Atlantic Herring	1,773,535	519,326	0.33%	2.25%
Skates	Skates	239,722	125,479	0.59%	0.90%
Silver hake	Northeast Multispecies (small-mesh)	97,186	25,993	0.18%	0.73%
Scup	Summer Flounder, Scup, Black Sea Bass	94,284	47,550	0.44%	0.67%
Loligo squid	Mackerel, Squid, and Butterfish	85,935	31,217	0.13%	0.31%
Atlantic mackerel	Mackerel, Squid, and Butterfish	151,724	20,483	0.11%	0.73%

Species	FMP	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings in the Mid-Atlantic and New England Regions*	Average Annual Landings as a Percentage of Total Landings in the RFA†
Monkfish	Monkfish	5,440	2,902	0.03%	0.07%
Spiny dogfish	Spiny Dogfish	62,007	24,793	0.19%	2.33%
American lobster	American Lobster	25,780	13,779	0.07%	1.03%
Jonah crab	Jonah Crab	12,348	7,438	0.06%	0.12%
Red hake	Northeast Multispecies (small-mesh)	10,185	4,860	0.36%	0.74%
Summer flounder	Summer Flounder, Scup, Black Sea Bass	14,798	10,002	0.11%	0.29%
Butterfish	Mackerel, Squid, and Butterfish	24,319	10,998	0.34%	0.89%
Sea scallops	Sea Scallop	1,712	848	0.00%	0.02%
Bluefish	Bluefish	18,315	9,243	0.51%	1.27%
Yellowtail flounder	Northeast Multispecies (large-mesh)	1,898	678	0.03%	0.17%
Cod	Northeast Multispecies (large-mesh)	1,240	617	0.01%	0.31%
Black sea bass	Summer Flounder, Scup, Black Sea Bass	2,997	2,036	0.11%	0.48%
Winter flounder	Northeast Multispecies (large-mesh)	3,556	1,467	0.04%	0.41%
Rock crab	Other FMPs, non-disclosed species and non-FMP fisheries	3,428	2,141	0.23%	0.32%

Source: Developed using data from NMFS (2021a, 2022).

Notes: The table shows landings of the top 20 species landed (by pounds) in the combined Lease Area and RWEC. The order of the species listed reflects the order (from high to low) of pounds landed in the two areas.

* See Table 3.9-2 for Mid-Atlantic and New England fisheries data by species.

† See Table 3.9-6 for RFA fisheries data by species.

Table 3.9-15 provides the average annual revenue along the RWEC area by gear type from 2008 through 2019. Together, pot gear, bottom trawl, and mid-water trawl gear accounted for approximately 86% of the

revenue generated by commercial fishing activity along the RWEC area. The area accounted for about 0.29% of mid-water trawl gear total revenue in the Mid-Atlantic and New England regions. The area accounted for about 2.32% of mid-water trawl total revenue in the RFA.

Table 3.9-15. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
Dredge-clam	ND	ND	ND	ND
Dredge-scallop	$20.6	$9.8	0.00%	0.02%
Gillnet-sink	$49.3	$28.1	0.09%	0.29%
Handline	$1.7	$1.1	0.02%	0.08%
Pot-other	$141.3	$86.6	0.08%	0.54%
Trawl-bottom	$263.6	$177.4	0.09%	0.41%
Trawl-midwater	*$131.8*	*$54.5*	*0.29%*	*2.32%*
All other gear‡	$27.6	$12.2	0.03%	0.46%
All gear types	$519.7	$369.6	0.04%	0.26%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* See Table 3.9-3 for Mid-Atlantic and New England fisheries data by gear type.

† See Table 3.9-7 for RFA fisheries data by gear type.

‡ Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-16 shows the ports where fish and shellfish caught along the RWEC from 2008 through 2019 were landed. Together, Point Judith, New Bedford, and Newport accounted for approximately 83% of the revenue generated by commercial fishing activity within the RWEC corridor. In terms of total commercial fishing revenue in the Mid-Atlantic and New England regions, Little Compton was the port most dependent on the RWEC corridor, with 1.4% of its revenue derived from the area. In terms of total commercial fishing revenue in the RFA, Newport was the port most dependent on the RWEC corridor, with 1.7% of its revenue derived from the area.

Table 3.9-16. Commercial Fishing Revenue of Federally Permitted Vessels along the Revolution Wind Export Cable by Port (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions*	Average Annual Revenue as a Percentage of Total Revenue in the RFA†
Point Judith, RI	$260.6	$195.1	0.42%	0.71%
New Bedford, MA	$111.0	$42.9	0.01%	0.09%
Little Compton, RI	$53.0	$28.2	1.42%	1.45%
Westport, MA	$12.8	$6.6	0.50%	0.56%
Newport, RI	$88.4	$50.2	0.56%	1.74%
Chilmark/Menemsha, MA	*$0.9*	*$0.4*	*0.09%*	*0.10%*
Fairhaven, MA	*$1.7*	*$0.9*	*0.01%*	*0.07%*
Montauk, NY	$6.1	$2.6	0.01%	0.02%
Fall River, MA	*$11.0*	*$4.8*	*0.43%*	*1.09%*
Tiverton, RI	*$1.9*	*$1.0*	*0.08%*	*0.15%*
Other Ports, MA	$6.3	ND	ND	ND
Point Pleasant, NJ	*$2.3*	*$0.7*	*0.00%*	*0.01%*
Newport News, VA	*$1.5*	*$0.4*	*0.00%*	*0.02%*
Beaufort, NC	$0.8	ND	ND	ND
Hampton, VA	*$1.2*	*$0.6*	*0.00%*	*0.04%*
Other New England/Mid-Atlantic ports‡	$15.2	$13.5	0.00%	0.05%
All New England/Mid-Atlantic Ports	$498.8	$348.1	0.04%	0.24%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND for average revenues and for percentages of other areas.

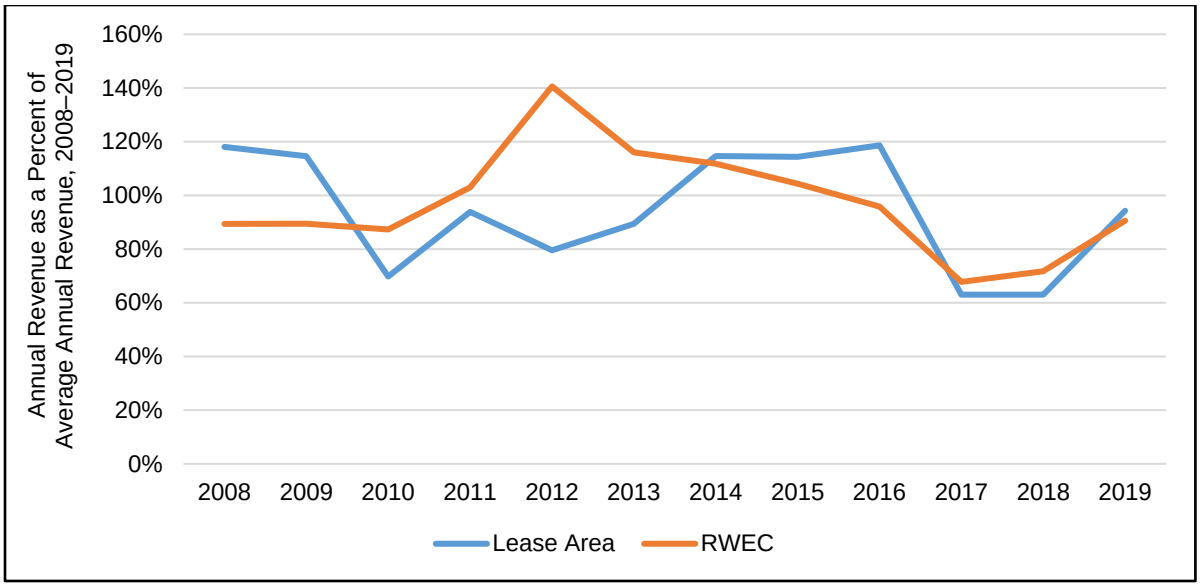
* See Table 3.9-4 for Mid-Atlantic and New England fisheries data by port.

† See Table 3.9-8 for RFA fisheries data by port.

‡ Includes ports with ND in the table and unlisted ports that had landings from federally permitted vessels fishing along the RWEC from 2008 through 2019.

VTR data describe most commercial fishing activity in both state and federal waters by vessels that have a federal permit or a state and federal fishing permit. However, those vessels with only state permits are not included in the NMFS VTR data set on which the data shown in the tables and figures are based.

Figure 3.9-6 summarizes the inter-annual variability of revenues within the lease area and the RWEC. Annual revenue in the lease area varies between 119% and 63% of the average from 2008–2019. Annual revenue within the RWEC varies between 141% and 68% of the average.



Source: Developed using data from NMFS (2022).

Figure 3.9-6. Interannual variability of commercial fishing revenue of federally permitted vessels in the Lease Area and along the Revolution Wind Export Cable, 2008–2019.

For-Hire Recreational Fishing: For-hire recreational fishing boats are operated by licensed captains for businesses that sell recreational fishing trips to anglers. These boats include both party (head) boats, which are defined as boats on which fishing space and privileges are provided for a fee, and charter boats, defined as boats operating under charter for a price, time, etc., and the participants are part of a preformed group of anglers (NMFS 2021d).

The following analysis focuses on for-hire recreational fishing activity in the Lease Area. The primary source of catch and effort data in the area was VTR data provided by NMFS (2021c).[19] To understand the relative importance of the Lease Area to federally permitted party and charter boats the analysis compares the vessel trips, and angler trips reported in the Lease Area to the total for-hire recreational fishing catch and effort across the Mid-Atlantic and New England Regions. In addition, to provide a more localized geographical context the analysis describes the for-hire recreational fishing activity occurring in and around the RI/MA WEA. This description includes a discussion of the area of high value fisheries that was excluded by BOEM from possible leasing for wind energy development in order to reduce conflict with both commercial and recreational fishing activities.

Regional Fisheries Area

A comprehensive list of species that are targeted by for-hire boats within the study area of the Rhode Island Ocean Special Management Plan was developed through an iterative process using catch data and correspondence with recreational charter boat captains (RI CRMC 2010). This study area encompasses a broad region in and around the RI/MA WEA, including portions of Block Island Sound, Rhode Island

[19] NMFS requires all federally permitted party and charter boats with a permit to fish for Atlantic bluefish, black sea bass, scup, summer flounder, tilefish, Atlantic mackerel, squid, and/or butterfish to submit a VTR for every fishing trip (50 CFR 648.7).

Sound, and the Atlantic Ocean. As shown in Table 3.9-17, for-hire boats target a wide range of pelagic, highly migratory, and demersal species.

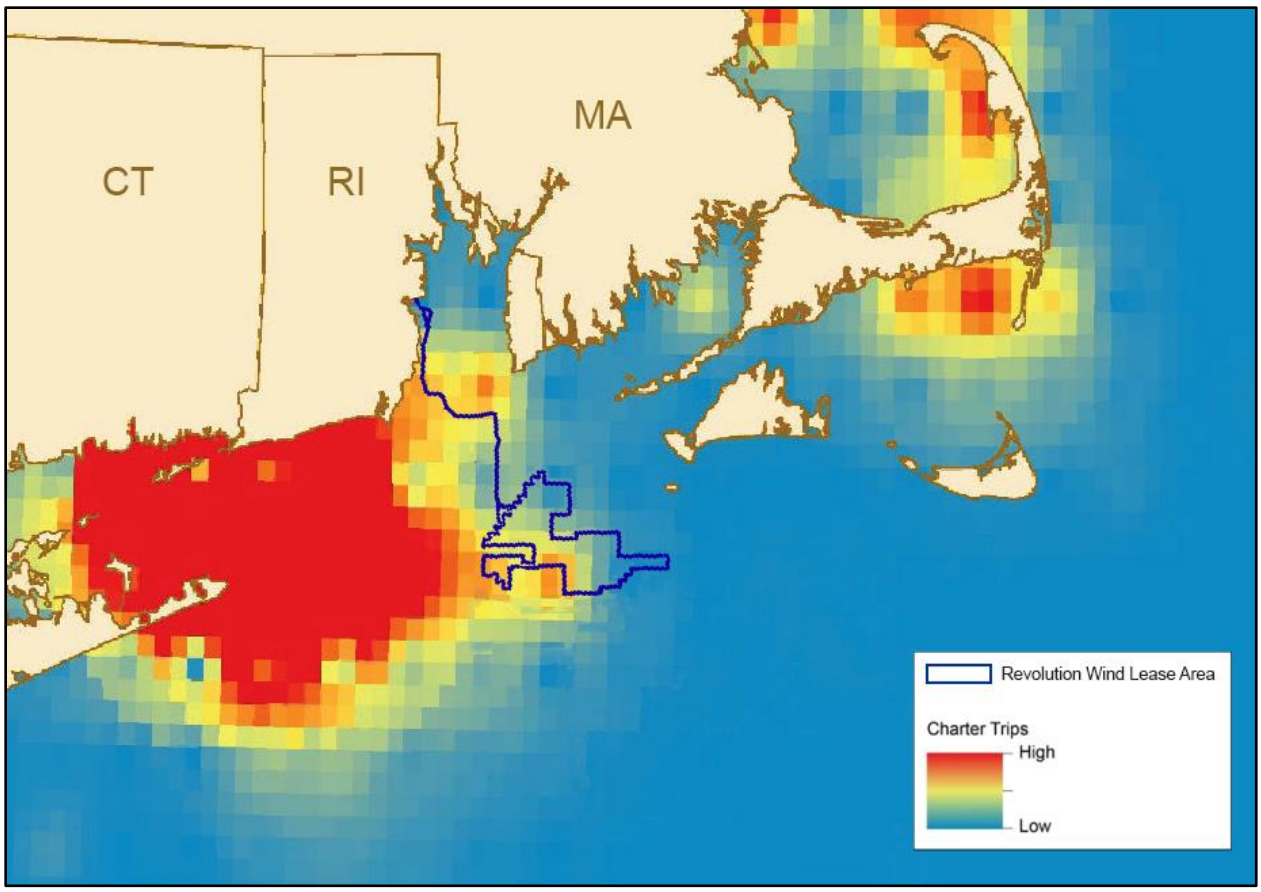
Table 3.9-17. Species Targeted by For-Hire Recreational Fishing Boats in the Rhode Island Ocean Special Management Plan Area

Atlantic bonito	False albacore	Blue shark	Tautog
Atlantic cod	Pollock	Thresher shark	Bluefin tuna
Black sea bass	Scup	Striped bass	Yellowfin tuna
Bluefish	Shortfin mako	Summer flounder	Winter flounder

Source: State of Rhode Island Coastal Resources Management Council (2010)

Recreational fishing in the region occurs year-round but is most intensive from April through November (Tetra Tech 2016). Early in spring, most of the Rhode Island–based party and charter boats target the migratory stocks of the Mid-Atlantic and New England regions such as striped bass, summer flounder, and black sea bass. During late spring, party and charter boats almost exclusively target cod, with most of the cod fishing occurring on Cox Ledge and south of Block Island (RI CRMC 2010). Cod fishing on Cox Ledge is also popular in the summer as the water warms and cod start to congregate on the ledge (Plaia 2009). However, most summer recreational fishing is focused on striped bass and bluefish, with some boats targeting summer flounder closer to shore. Later in the summer, some of the boats move farther offshore to target sharks, which are generally caught anywhere from 20 to 50 miles offshore. Sharks targeted include blue, mako, and thresher sharks, with most shark fishing being catch and release. Some tuna fishing also takes place in an area east of Block Island and northwest of Cox Ledge known as the Mud Hole or Deep Hole. Starting in September, much of the fishing switches to sea bass and scup around Block Island or to striped bass closer to shore (RI CRMC 2010). Many recreational fishermen participate in organized sportfishing tournaments during the year. For example, the Rhode Island Saltwater Anglers Association sponsors 15 tournaments per year and a "Yearlong Tournament" targeting the majority of recreational species in the Rhode Island Ocean Special Management Plan Area (RI CRMC 2010).

As shown in Figure 3.9-7, which presents spatial data indicating the relative intensity of charter fishing activity, the number of charter fishing trips is fairly low in the RI/MA WEA.



Source: Adapted from BOEM (2019).

Figure 3.9-7. Distribution of vessel trip report data for charter vessels (2001–2010).

Most for-hire boats fishing near the RI/MA WEA are based in Rhode Island. However, party and charter boats from New York, Connecticut, and Massachusetts also regularly fish in or near the RI/MA WEA. For-hire recreational fishing is an integral part of each of these states' coastal tourism industries. From 2007-2012, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts. However, of the 16,569 average annual for-hire boat trips that left from ports in the four states each year from 2007 to 2012, only 0.9% occurred in or near the RI/MA WEA (Kirkpatrick et al. 2017).

The 70 square miles of Cox Ledge excluded from the RI/MA WEA is important to for-hire recreational fishing and commercial fisheries. Table 3.9-18 presents data on party/charter recreational fishing reported on Cox Ledge during various time periods. The data suggest that a small number of for-hire recreational fishing businesses fish relatively intensively on Cox Ledge, with each individual business generating on the order of $9,400 per year in the area. The revenue reported on Cox Ledge is consistently high across all time periods studied (NEFMC and NMFS 2016).

Table 3.9-18. For-Hire Recreational Fishing Activity on the Portion of Cox Ledge Excluded from Wind Energy Development by Time Period

Time Period	Average Annual Revenue	Average Revenue Per Trip	Average Annual Number of Permit Holders	Average Annual Number of Anglers
2006–2014	$95,911	$2,385	10	887
2010–2014	$88,928	$2,257	9	816
2012–2014	$64,696	$2,521	6	587

Source: NEFMC and NMFS (2016)

Lease Area

Table 3.9-19 lists the top nine species most frequently kept on party/charter boat trips in the Lease Area from 2008 through 2018.

Table 3.9-19. For-Hire Recreational Fishing Landings in the Lease Area by Species (2008–2018 average)

Species	Average Annual Number of Fish	Average Annual Number of Fish as a Percentage of Total Fish Landed in the Lease Area
Scup	5,809	33.9%
Cod	4,832	28.2%
All Others	3,529	20.6%
Black Sea Bass	2,332	13.6%
Summer Flounder	235	1.4%
Bluefish	200	1.2%
Striped Bass	108	0.6%
Red Hake	80	0.5%
Cunner	28	0.2%
Dogfish Spiny	4	0.0%
Total	17,157	100.0%

Source: NMFS (2021c)

Notes: The category "All Others" refers to species with less than three permits impacted to protect data confidentiality.

To understand the relative importance of the Lease Area to for-hire recreational fishing in the Mid-Atlantic and New England Regions as a whole, Table 3.9-20 compares the vessel trips and angler trips reported in the Lease Area to the total for-hire recreational fishing effort in the Mid-Atlantic and New England Regions from 2008 through 2018. The Lease Area annually accounted for 0.12% or less of the total vessel trips, and 2.09% or less of the total angler trips. Based on marine angler expenditure survey data, it is estimated that from 2008 through 2018, trips in the Lease Area annually generated an average of $25,909 (in 2019 dollars) in revenue across all for-hire fishing operations, with a low of $3,000 in 2008,

and a high of $59,000 in 2016 (NMFS 2021c). This revenue amount is a small fraction of the total earned by regional for-hire fishing operations. As described above, from 2007 through 2012, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts.

Table 3.9-20. Annual For-Hire Recreational Fishing Vessel Trips and Angler Trips in the Lease Area (2008–2018)

Year	Average Annual Number of Vessel Trips	Average Annual Vessel Trips as a Percentage of Total Vessel Trips in the Mid-Atlantic and New England Regions	Average Annual Number of Angler Trips	Average Annual Angler Trips as a Percentage of Total Angler Trips in the Mid-Atlantic and New England Regions
2008	5	0.02%	32	0.49%
2009	7	0.03%	60	1.15%
2010	31	0.09%	382	2.09%
2011	22	0.07%	170	0.81%
2012	27	0.09%	459	2.7%
2013	14	0.05%	159	0.86%
2014	10	0.04%	226	1.5%
2015	17	0.07%	208	1.73%
2016	29	0.12%	566	3.1%
2017	26	0.11%	320	3.26%
2018	6	0.03%	50	1.51%

Source: NMFS (2021c)

Notes: The term “vessel trips” refers to the number of party/charter VTRs submitted to NMFS where landings of any species were recorded; the term “angler trips” refers to the number of reported passengers on party/charter VTRs.

Data provided in NMFS (2021c) were used to analyze differences in the economic importance of fishing grounds in the Lease Area across for-hire recreational fishing operations. These data summarize the percentage of each federally permitted party/charter vessel's total angler trips coming from within Lease area. The vessel-level angler trip percentages were divided into quartiles, which were created by ordering the data from the lowest to highest percentage and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages, while the fourth quartile represents the highest 25%. In addition, the data provided in NMFS (2021c) reported the number of “outlier” vessels in the distribution of percent of angler trips. In the context of this analysis, an outlier is a vessel that had an exceptionally high proportion of its annual angler tips coming from the Lease Area in comparison to other vessels that fished in the area.

From 2008 through 2019, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 12-year period) had 5% of its total angler trips coming from the Lease Area (NMFS 2021c). Of the outliers, the vessel with the greatest dependence on the Lease Area had 44% of its total angler trips coming from the area during the 11-year

period. The boxplot in NMFS (2021c) shows that in the 11-year period shown, that more than 75 percent of the permit holders generated 10% or less of their total angler trips from Lease area. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

Table 3.9-21 shows the annual vessel trips and angler trips reported in the Lease Area by port of departure. For-hire recreational vessels based in Point Judith and Montauk were the most dependent on the Lease Area. From 2008 through 2018, Point Judith accounted for 56% of the vessel trips in the Lease Area, and 41% of the angler trips; Montauk accounted for 26% of the vessel trips in the Lease Area, and 18% of the angler trips.

Table 3.9-21. Annual For-Hire Recreational Fishing Vessel Trips and Angler Trips in the Lease Area by Port (2008–2019)

Year	Trip Type	Point Judith, Rhode Island	Other Rhode Island Ports*	Montauk, New York	Other New York Ports*	All Massachusetts Ports	All Connecticut Ports	No Port Data
2008	Vessel Trips	4	1	0	0	0	0	0
	Angler Trips	28	4	0	0	0	0	0
2009	Vessel Trips	5	2	0	0	0	0	0
	Angler Trips	52	8	0	0	0	0	0
2010	Vessel Trips	0	12	17	1	0	1	0
	Angler Trips	0	125	242	3	0	12	0
2011	Vessel Trips	5	1	16	0	0	0	0
	Angler Trips	68	11	91	0	0	0	0
2012	Vessel Trips	18	1	0	6	1	1	0
	Angler Trips	350	3	0	99	1	6	0
2013	Vessel Trips	9	0	0	5	0	0	0
	Angler Trips	103	0	0	56	0	0	0
2014	Vessel Trips	0	8	0	2	0	0	0
	Angler Trips	0	180	0	46	0	0	0
2015	Vessel Trips	7	3	0	5	2	0	0
	Angler Trips	169	8	0	26	5	0	0
2016	Vessel Trips	23	0	0	3	3	0	0
	Angler Trips	526	0	0	22	18	0	0
2017	Vessel Trips	8	0	17	0	1	0	0
	Angler Trips	184	0	134	0	2	0	0

Year	Trip Type	Point Judith, Rhode Island	Other Rhode Island Ports*	Montauk, New York	Other New York Ports*	All Massachusetts Ports	All Connecticut Ports	No Port Data
2018	Vessel Trips	0	2	0	1	2	0	1
	Angler Trips	0	35	0	6	6	0	3

Source: NMFS (2021c)

Notes: The term "vessel trips" refers to the number of party/charter VTRs submitted to NMFS where landings of any species were recorded; the term "angler trips" refers to the number of reported passengers on party/charter VTRs.

* "Other Rhode Island Ports" and "Other New York Ports" refer to ports with less than three permits to protect data confidentiality.

3.9.1.1 Future Offshore Wind Activities (without Proposed Action)

3.9.1.1.1 Offshore Activities and Facilities

Accidental releases and discharges: Construction and O&M activities related to offshore wind energy development that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. In turn, these impacts could decrease species availability and catchability for a fishery. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Compliance with these requirements would effectively minimize releases of water quality contaminants and trash or debris. For any given offshore wind energy project, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts is anticipated to be **negligible** adverse. Details regarding the potential impacts of accidental releases and discharges to finfish and EFH are described in Section 3.13.

Anchoring: Anchoring vessels used in the construction of offshore wind energy projects could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. Although anchoring impacts would occur primarily during construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). Therefore, the adverse effects of offshore wind energy-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **minor**.

Climate change: Impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat/distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch and/or increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. The catch potential for the temperate Northeast Atlantic is projected to decrease between now and the 2050s (Barange et al. 2018). Hare et al. (2016) predicted that climate change would affect northeast fishery species differently. For approximately half of the 82 species assessed, the authors report that overall climate vulnerability is high to very high; diadromous fish and benthic invertebrate species exhibit the greatest vulnerability. In addition, most species included in the assessment have a high potential for a change in distribution in response to projected changes in climate. Adverse effects of climate change are expected for approximately half of the species assessed; however, some species are expected to increase in stock distribution and/or productivity (Hare et al. 2016). The intensity of the impacts of climate change to commercial fisheries and for-hire recreational fishing is anticipated to qualify as **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change, and the beneficial impacts are anticipated to qualify as **minor** to **major** for those fishing operations targeting species expected to increase in stock distribution and/or productivity as a result of climate change.

The economies of communities reliant on marine species vulnerable to climate change could be adversely affected. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise (Colburn et al. 2016; Rogers at al. 2019).

As they become operational, future offshore wind facilities would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities. This reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term beneficial impacts to fishing operations that target species adversely affected by climate change. However, given the global scale of GHG emissions, the benefits would be **negligible**. Section 3.4 describes the expected contribution of offshore wind to air emissions and climate change.

Light: Construction and O&M activities related to offshore wind energy development that introduce artificial lighting could result in behavioral responses from some target species, such as fish not biting at hooks or changing swim height. In turn, these responses could decrease the catchability of target species. For any given offshore wind energy project, adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** to **minor** adverse and short term. Details regarding potential lighting impacts to finfish and EFH are described in Section 3.13

New cable emplacement/maintenance: Under the No Action Alternative, approximately 10,024 miles of offshore export and inter-array cables could be installed along the U.S. east coast to support future offshore wind energy projects (see Appendix E3). To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. BOEM (2018) notes that the standard commercial practice is to bury submarine cables 4 to 6 feet deep in waters shallower than 6,562 feet to protect them from external aggression hazards, such as fishing gear and anchors. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss or damage is expected to be long term but **negligible** to **minor** adverse.

In areas where seafloor conditions or other factors might not allow for cable burial, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. Impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage and navigation hazards are discussed below under the presence of structures IPF.

Fishermen have raised concerns regarding the suspected behavioral impacts of EMF generated by submarine cables on target fish and invertebrates (BOEM 2018). In particular, there is concern that EMF could slow or deviate migratory species from their intended routes, with subsequent potential problems for populations if they do not reach essential feeding, spawning, or nursery grounds (Kirkpatrick et al. 2017). To date, however, effects on representative sensitive species indicate that although some marine species are observed to respond to EMF, the responses have not risen to the level at which critical impacts on marine organism behavior are reported (BOEM 2018) (see Section 3.6 and Section 3.13). There is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc.

and Exponent 2019). Therefore, the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term but **negligible** to **minor** adverse.

Noise: Construction and O&M activities related to offshore wind energy development that increase underwater noise could result in behavioral responses from some target species, such as fish not biting at hooks or changing swim height. In turn, these responses could decrease the catchability of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Some sources of noise, such as vessels and pile driving during project construction, could cause some target species to temporarily move away from the source and disperse to other areas. These species are expected to return to the area after the noise ends. The effects of operational underwater noise from future offshore wind energy projects would occur for the life of the projects but are not anticipated to have population-level effects on target species. For any given offshore wind energy project, all adverse noise impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term during construction and long term during O&M. The intensity of impacts is anticipated to be **moderate** adverse. Details regarding potential noise impacts to finfish and EFH are described in Section 3.13; impacts to invertebrate resources are described in Section 3.6.

Presence of structures: The presence of structures can lead to impacts on commercial fisheries and for-hire recreational fishing through habitat conversion, fish aggregation, navigation hazards, allisions, entanglement or gear loss/damage, and space use conflicts. With respect to offshore wind energy development, these impacts could arise from buoys, met towers, foundations, scour/cable protection, and transmission cable infrastructure. Under the assumptions in Appendix E3, future offshore wind energy projects under the No Action Alternative would include the installation of 3,008 WTG and OSS foundations. In addition, projects could install buoys and meteorological evaluation towers. BOEM anticipates that structures would be added intermittently over an assumed 10-year period and that they would remain until decommissioning of each facility is complete.

The installation of offshore components for offshore wind energy projects could temporarily restrict fishing vessel movement and thus transit and harvesting activities within lease areas and along offshore export cable corridors. To safeguard mariners from the hazards associated with installation of these offshore components, it is expected that the USCG would create safety zones around offshore wind energy project construction areas (BOEM 2018). Fishing vessels would be prohibited from entering these safety zones. When the safety zones are in effect, fishing vessels could either forfeit fishing revenue or relocate to other fishing locations and continue to earn revenue. However, vessels that chose to relocate could incur increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea, assuming pay is not based on a percentage of harvest earnings) and/or lower revenue (e.g., less-productive area or less-valuable species).

In addition, construction activities related to offshore wind energy development could overlap with the spawning habitat and/or spawning season of a number of species targeted by commercial and for-hire recreational fisheries, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species (see Section 3.6 and Section 3.13). Therefore, the adverse impact on the catch of commercial and for-hire recreational fisheries targeting affected species would be short term or long term **negligible** to **moderate**, depending on the species. See also noise and light impacts to commercial fisheries and for-hire recreational fishing.

Once offshore components are installed, the presence of the WTG and OSS foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclams) and increase the habitat for target species that prefer hard-bottom habitat (e.g., lobster, striped bass, black sea bass, and cod). Where WTG and OSS foundations and associated scour protection produce an artificial reef effect and attract finfish and invertebrates, the aggregation of species could increase the catchability of some target species (Kirkpatrick et al. 2017). Although species that rely on soft-bottom habitat would experience a reduction in favorable conditions, the impacts from structures are not expected to result in population-level impacts (see Section 3.6 and Section 3.13). Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a long-term **negligible** to **moderate** effect on the target species catch of for-hire recreational and commercial fisheries.

As discussed above, the USCG does not plan to create exclusionary zones around offshore wind facilities during their operations (BOEM 2018). However, WTGs and OSSs would be visually detectable at a considerable distance during the day and easily detected by vessels equipped with radar regardless of the time of day. As described in Chapter 2 under the Proposed Action Alternative, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to Navigation and Lighthouse Authorities guidelines, and NOAA would chart WTG locations and could include a physical or virtual automatic identification system (AIS) at each turbine. Some fishing vessels operating in or near offshore wind facilities could experience radar clutter and shadowing. As discussed in Section 3.16, the USCG has reviewed all available studies on radar interference and found that although these studies show that structures could have some effect upon radar, they do not render radar inoperable.

Notwithstanding these safety measures, some fishermen have commented that because of safety considerations, they would not enter an offshore wind array during inclement weather, especially during low-visibility events (Kirkpatrick et al. 2017). In addition, trawl and dredge vessel operators have expressed specific concerns about being unable to safely deploy gear and operate in a WEA given the size of the gear, the spacing between the WTGs, and the space required to safely navigate (BOEM 2021b). Navigating through the WEAs would not be as problematic for for-hire recreational fishing vessels, which tend to be smaller than commercial vessels and do not use large external fishing gear (other than hook and line) that makes maneuverability difficult. However, trolling for highly migratory species (e.g., bluefin tuna, or swordfish) could involve deploying many feet of lines and hooks behind the vessel and then following large pelagic fish once they are hooked, which pose additional navigational and maneuverability challenges around WTGs (BOEM 2021b).

A potential effect of the presence of the offshore cables associated with offshore wind energy development is the entanglement and damage or loss of commercial and recreational fishing gear. Specifically, cable protection in the form of rock berms, concrete mattresses, fronded mattresses, and/or rock bags could cause a potential safety hazard should gear snag or hook on these seafloor structures. Economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced. Given that mobile fishing gear is actively pulled by a vessel over the seafloor, the chance of snagging this gear type on transmission cable infrastructure is greater than if—as in the case of fixed gear—the gear was set on the infrastructure or waves or currents pushed the gear into the infrastructure (BOEM 2021b).

Fishing vessel operators unwilling or unable to travel through areas where offshore wind facilities are located or deploy fishing gear in those areas could be able to find suitable alternative fishing locations and continue to earn revenue. This could result in increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea, assuming pay is not based on a percentage of harvest earnings) and/or lower revenue (e.g., fishing in a less-productive area or for a less-valuable species). However, if at times a fishery resource is only available within the wind facility, some fishermen, primarily those using mobile gear, could lose the revenue from that resource for the time the resource is inaccessible. These impacts could remain until decommissioning of each facility is complete, although the magnitude of the impacts would diminish over time if fishing practices adapt to the presence of structures.

An accurate assessment of the extent of the effects of planned offshore wind energy projects on commercial fisheries and for-hire recreational fishing in the GAA would depend on project-specific information that is unknown at this time, such as the actual location of offshore activities within lease areas and the arrangement of WTGs. However, it is possible to estimate the amount of commercial fishing revenue that would be "exposed" (i.e., potentially foregone) as a result of offshore wind energy development. Estimates of revenue exposure quantify the value of fishing that occurs in the footprint areas of individual offshore wind farms based on historical spatial catch data. Therefore, these estimates represent the fishing revenue that would be foregone if fishing vessel operators opt to no longer fish in these areas and cannot capture that revenue in a different location. Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the potential for continued fishing to occur within the footprint of the wind farm, together with the ecological impact on target species residing within these lease areas. Economic impacts also depend on a vessel's ability to adapt to changing where it fishes. For example, if alternative fishing grounds are available nearby and could be fished at no additional cost, the economic impact would be lower. In addition, it is important to note that there could be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For example, some fishermen could gain utility from being able to fish in locations that are known to them and also fished by their peers; the presence of other boats in the area could contribute to the fishermen's sense of safety.

Table 3.9-22 shows the annual commercial fishing revenue exposed to offshore wind energy development in the New England and Mid-Atlantic regions by FMP fishery from 2020-2030. The amount of revenue at risk increases as proposed offshore wind energy projects are constructed and come online according to the timeline set forth in Table E-1 of Appendix E. The largest impacts in terms of exposed revenue are expected to be in the Skates, Sea Scallop, and Surfclam/Ocean Quahog FMP fisheries. The total average annual exposed revenue from 2020-2030 represents approximately 2% of the average annual revenue of all FMP and non-FMP fisheries in the New England and Mid-Atlantic regions from 2008 through 2019 (see Table 3.9-1). The maximum exposed revenue—which is projected to occur as early as 2029 when construction on the last of the foreseeable projects could begin—represents about 3.6% of the average annual revenue of all FMP and non-FMP fisheries in the regions. In general, fisheries do not have high relative revenue intensity within the lease areas compared with nearby waters because lease areas were chosen to reduce potential use conflicts between the wind energy industry and fishermen (Ecology and Environment, Inc. 2013).

Table 3.9-22. Annual Commercial Fishing Revenue Exposed to Offshore Wind Energy Development in the New England and Mid-Atlantic Regions under the No Action Alternative by Fishery Management Plan (2008–2019)

FMP Fishery ($1,000s)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
American Lobster	$0.0	$0.0	$152.2	$197.8	$270.7	$427.1	$526.7	$581.4	$636.0	$636.0
Atlantic Herring	–	–	$29.5	$61.6	$81.0	$133.3	$174.8	$207.2	$239.5	$239.5
Bluefish	$0.0	$0.0	$4.1	$6.8	$11.0	$14.5	$16.5	$18.0	$19.5	$19.5
Highly Migratory Species	$0.0	$0.0	$0.1	$0.2	$0.7	$0.9	$1.2	$1.4	$1.6	$1.6
Jonah Crab	$0.0	$0.0	$41.1	$78.6	$224.4	$311.0	$335.3	$355.8	$376.4	$376.4
Mackerel, Squid, and Butterfish	$0.1	$0.1	$310.8	$553.8	$756.5	$1,122.6	$1,275.9	$1,409.7	$1,543.6	$1,543.6
Monkfish	$0.0	$0.0	$355.1	$428.3	$535.4	$699.8	$803.6	$886.1	$968.6	$968.6
Northeast Multispecies (large-mesh)	–	–	$150.3	$164.9	$182.6	$231.8	$254.2	$268.4	$282.7	$282.7
Northeast Multispecies (small-mesh)	$0.0	$0.0	$97.5	$139.4	$229.5	$320.4	$348.8	$365.6	$382.5	$382.5
Sea Scallop	$0.0	$0.0	$357.6	$2,601.8	$2,876.4	$7,819.6	$12,686.9	$17,527.1	$22,367.4	$22,367.4
Skates	–	–	$184.5	$223.6	$284.3	$379.4	$430.7	$462.9	$495.1	$495.1
Spiny Dogfish	–	–	$13.5	$20.7	$25.5	$31.5	$35.6	$37.7	$39.8	$39.8
Summer Flounder, Scup, Black Sea Bass	$0.1	$0.1	$222.5	$392.3	$592.1	$863.4	$1,049.3	$1,214.2	$1,379.2	$1,379.2
Other FMPs, non-disclosed species, and non-FMP fisheries*	$0.4	$0.4	$656.3	$819.2	$1,015.9	$1,616.2	$2,029.8	$2,411.6	$2,793.4	$2,793.4
All revenues of federally permitted vessels	$0.7	$0.7	$2,711.1	$5,867.5	$7,933.8	$15,239.3	$21,641.1	$27,823.5	$34,005.9	$34,005.9

Source: Developed using construction schedule data from Table E-1 in Appendix E and fishing revenue data from NMFS (2021b).

Notes: Exposed revenue estimates are based on commercial fishery revenues in Atlantic offshore wind energy lease areas exclusive of the Revolution Wind Lease Area. Revenue is adjusted for inflation to 2019 dollars and is estimated based on the annual average revenue by FMP from 2008 through 2019.

"–" indicates the value is zero; "$0" indicates the value is positive but less than $500.

* Includes all species not assigned to an FMP, as listed in the table.

With respect to impacts to individual fishing operations, those vessels that derive a small percentage of their total revenue from areas where offshore wind facilities would be located or are able to find suitable alternative fishing locations would likely experience long-term **negligible** to **moderate** adverse impacts due to the presence of structures. For those fishing vessels that derive a large percentage of their total revenue from areas where offshore wind facilities would be located, that choose to avoid these areas once the facilities become operational, and are unable to find suitable alternative fishing locations, the adverse impacts of the presence of structures would be long term **moderate** to **major**. NMFS (2021b) determined for each federally permitted commercial fishing vessel that fished in New England/Mid-Atlantic offshore wind energy development lease areas the percentage of the vessel's total fishing revenue from 2008 through 2019. It is estimated that over that period, only 0.9% of the vessels that fished in one or more of the lease areas generated more than 50% of their total fishing revenue for the year from one or more of the areas. According to the data presented, in each Lease Area there were one or more vessels that earned a substantial (> 5%) portion of their revenue from fishing in the area. Some vessels derived more than half of their revenue from fishing in a particular Lease Area. However, 75% of the vessels fishing in any given Lease Area derived less than 0.9% of their total revenue from the area.

It is conceivable that some of the small number of fishing operations that derive a large percentage of their total revenue from areas where offshore wind energy facilities would be located would choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term **major** adverse impacts. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. A majority derive a small percentage of their total revenue from any one Lease Area or would be able to relocate to other fishing locations. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Therefore, BOEM expects that the impacts resulting from offshore wind energy development would be long term **moderate** to **major** adverse, depending on the fishery and fishing operations. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects (see BOEM 2022), adverse impacts on commercial fisheries due to the presence of structures could be reduced.

Regulated fishing effort: Commercial and recreational regulations for finfish and shellfish implemented and enforced by NMFS and coastal states affect how the commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These FMPs can reduce or increase the size of available landings to commercial and for-hire recreational fisheries. For example, ongoing fishing restrictions designed to rebuild depleted stocks in the Northeast Multispecies (large-mesh) fishery would continue to reduce landings in that fishery. If successful, these measures would ensure the long-term sustainability of fishery resources, which would be a positive impact on fishery operations by maximizing sustainable yield of fishery resources over the long term.

Offshore wind energy development could influence regulated fishing effort through two primary pathways: by changing fishing behavior to such an extent that overall harvest levels are not as predicted, and by impacting NMFS ongoing scientific surveys on which management measures are based. If NMFS scientific survey methodologies are not adapted to sample within wind energy facilities, then there could be increased uncertainty in scientific survey results, which would increase uncertainty in stock

assessments and quota setting processes (BOEM 2021b). Future spatial management measures could change in response to changes in fishing behavior due to the presence of structures. Impacts on management processes would in turn have short-term or long-term impacts on commercial and for-hire recreational fisheries' operations.

As described in Section 3.17, BOEM anticipates that reasonably foreseeable offshore wind energy activities could have major adverse effects on NMFS scientific research and protected species surveys, primarily because of the potential impacts of structures to NMFS survey efforts. In turn, these impacts could potentially lead to long-term adverse impacts on fishery participants and communities. In 2022, NMFS and BOEM developed a draft Federal Survey Mitigation Strategy that identifies the essential components of mitigating the impacts of offshore wind energy development on NMFS scientific research and protected species surveys, as well as actions to accomplish the goals and objectives of mitigation (Hare et al. 2022). Implementation of this strategy is expected to reduce potential effects on commercial fisheries and for-hire recreational fishing, leading to a long-term **moderate** adverse impact level.

With respect to reasonably foreseeable activities other than offshore wind energy, proposed fishery management actions include measures to reduce the risk of interactions between fishing gear and the NARW. This would likely have a long-term **major** adverse impact on fishing effort in the lobster and Jonah crab fisheries in the GAA. In addition, changing climate and ocean conditions and the resultant effects on species distributions and productivity can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits.

Vessel traffic: Construction of offshore wind energy projects would require staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and potentially feeder lift barges and heavy lift barges. A more limited number of vessels would also be required for routine maintenance during the O&M phase. The additional vessel volume could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions. These potential adverse impacts could cause some fishing vessel operators to change routes (see Section 3.16).

Once offshore wind energy projects are completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the areas by the prospect of higher catches. As discussed above, WTG and OSS foundations and associated scour protection could produce an artificial reef effect, potentially increasing fish and invertebrate abundance within a facility's footprint. According to ten Brink and Dalton (2018), the influx of recreational fishermen into the Block Island Wind Farm caused some commercial fishermen to cease fishing in the area because of vessel congestion and gear conflict concerns. If these concerns cause commercial fishermen to shift their fishing effort to areas not routinely fished, conflict with existing users could increase as other areas are encroached. In general, the potential for conflict among commercial fishermen due to fishing displacement could be higher in a fixed gear fishery with regulations that restrict where individual permit holders in the fishery can fish, such as the lobster fishery. However, the potential for vessel congestion and gear conflict could also increase if mobile species targeted by commercial fishermen, such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish, are attracted to offshore wind energy facilities by the artificial reef effect, and fishermen targeting these species concentrate their fishing effort in offshore wind farm lease areas as a result.

Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing are expected to be long term **minor** to **moderate** adverse.

Onshore Activities and Facilities

Port utilization: Offshore wind energy projects would require vessels for staging and installation during construction and for routine maintenance during operations. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. These potential adverse impacts could cause some fishing vessel operators to use an alternative port. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to port facilities (see Section 3.16). In addition, the use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, port utilization impacts to commercial fisheries and for-hire recreational fishing are expected to be localized long term **minor** to **moderate** adverse.

3.9.1.2 Conclusions

BOEM anticipates that reasonably foreseeable offshore wind activities would have long-term **moderate** to **major** adverse impacts on commercial fisheries and **minor** to **moderate** adverse impacts on for-hire recreational fishing in the GAA. These impacts would be primarily due to the increased presence of offshore structures (foundations and cable protection measures) that could reduce fishing access, increase the risk of fishing gear damage or loss, and prevent or hamper continued NMFS scientific research surveys. The extent of adverse impacts would vary by fishery and fishing operations due to differences in target species, gear type, and the predominant location of fishing activity. The impacts could also include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Implementation of BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation (BOEM 2022), together with implementation of the Federal Survey Mitigation Strategy (Hare et al. 2022), would reduce adverse impacts on commercial fisheries and for-hire recreational fishing.

3.9.2 Environmental Consequences

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

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The proposed PDE parameters (see Appendix D) in Table 3.9-23 would influence the magnitude of the impacts on commercial fisheries and for-hire recreational fishing.

Table 3.9-23. Project Design Parameters That Could Reduce Impacts

Parameter	Influence
The number, size, and location/orientation of WTGs	Could affect access to fishing grounds, allisions and vessel collisions, and availability of targeted species
Total length and route of inter-array and offshore export cables, including ability to reach target burial depths	Could affect the ability of fishing vessels to operate in or transit the area and cause entanglements and gear loss as well as changes in benthic habitat type if armoring of cables with concrete mattresses is required in order to protect cables
Number of simultaneous vessels, number of trips, size of vessels, and marine traffic routes to and from the Lease Area	Could affect potential risk for vessel collisions and use of port facilities
Time of year during which construction occurs	Could affect access to fishing areas and availability of targeted fish in the area, thereby reducing catch and fishing revenue

EPMs implemented during construction, O&M, and decommissioning would decrease the potential for impacts to commercial fisheries and for-hire recreational fishing (see Table F-1 in Appendix F). These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for commercial fisheries and for-hire recreational fishing across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Table E2-12.

Table 3.9-24 provides a summary of IPF findings carried forward for analysis in this section. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Under all of the alternatives, the overall impact to commercial fisheries and for-hire recreational fishing from any alternative would be **moderate** adverse as mitigation would reduce adverse impacts substantially during the life of the proposed Project, including decommissioning; the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken.

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Table 3.9-24. Comparison of Evaluated Impact-Producing Factors under Action Alternatives for Commercial Fisheries and For-Hire Recreational Fishing

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Offshore**: Construction and O&M activities related to offshore wind energy development that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. For any given offshore wind energy project, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts is anticipated to be **negligible** adverse.	**Offshore**: Project construction activities that reduce water quality could have a physiological or behavioral impact on some species targeted by commercial and for-hire recreational fisheries in the GAA. In turn, these impacts could decrease species availability and catchability for a fishery. The impacts during Project construction, O&M, and decommissioning from Project-related accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized, and the intensity of impacts is anticipated to be **negligible** adverse. The effects could be short term to long term depending on the type and volume of material released. The impacts of accidental releases and discharges of the Proposed Action on the target species catch of commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term to long term **negligible** to **minor** adverse.	**Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of accidental releases and discharges on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the accidental releases and discharges impact level for finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of accidental releases and discharges to commercial fisheries and for-hire recreational fishing in the GAA would be similar to the Proposed Action: short term to long term **negligible** adverse for all design configurations analyzed. For all design configurations analyzed, the accidental releases and discharges impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: short term to long term **negligible** to **minor** adverse.			
Anchoring	**Offshore**: Anchoring vessels used in the construction of offshore wind energy projects could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). Therefore, the effects of offshore wind energy-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **minor** adverse.	**Offshore**: Anchoring vessels used in the construction of the Project could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All anchoring impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Therefore, the adverse effects of Project-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short- term **negligible** to **minor**. While anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M. Therefore, the adverse effects of Project-related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **negligible** to **minor**. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. Impacts from anchoring due to present and future military, survey, commercial, and recreational activities, including the Proposed Action, could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. The anchoring impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **minor** adverse.	**Offshore**: The anchoring impact on navigation and vessel traffic under Alternatives C through F would be similar to the Proposed Action. Therefore, the impact of anchoring to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that of the Proposed Action: short term **negligible** to **minor** adverse for all design configurations analyzed. For all design configurations analyzed, the anchoring impact of Alternatives C through F on navigation and vessel traffic would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **minor** adverse.			
Climate change	**Offshore**: Impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. The intensity of the impacts of climate change to commercial fisheries and for-hire recreational fishing is anticipated to qualify as **minor** to **major** adverse for those fishing operations targeting species adversely affected by climate change, and the beneficial impacts are anticipated to qualify as	**Offshore**: The types of impacts from global climate change to commercial fisheries and for-hire recreational fishing described for the No Action Alternative would occur under the Proposed Action. These impacts are expected to be long term **major** adverse. As they become operational future offshore wind facilities, including the Proposed Action, would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities. However, given the global scale of GHG emissions, the benefits would be **negligible**.	**Offshore**: The climate change impact level under Alternatives C through F due to a change in GHG emissions would be similar to that for the Proposed Action: long term **major** adverse for all design configurations analyzed. For all design configurations analyzed, the impact of Alternatives C through F on GHG emissions would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** beneficial.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	minor to **major** for those fishing operations targeting species beneficially affected by climate change. As they become operational, future offshore wind facilities would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities. However, given the global scale of GHG emissions, the benefits would be **negligible**.					
Light	**Offshore**: Construction and O&M activities related to offshore wind energy development that introduce artificial lighting could result in behavioral responses from some target species. For any given offshore wind energy project, adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts is anticipated to be **negligible** to **minor** adverse.	**Offshore**: Project construction, O&M, and decommissioning activities that introduce artificial lighting could result in behavioral responses from some target species. Project EPMs include construction vessel light shielding and operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment. Project-related lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term. The intensity of impacts resulting from lighting are anticipated to be **negligible** to **minor** adverse. The adverse lighting impacts from ongoing and future offshore activities, including the Proposed Action, on the target species catch of commercial and for-hire recreational fisheries are expected to be localized and short term. The light impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **minor** adverse.	**Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of lighting on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the lighting impact level for finfish and invertebrates would be similar to that for the Proposed Action. Therefore, the impact of lighting on commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: short term **negligible** to **minor** adverse for all design configurations analyzed. For all design configurations analyzed, the lighting impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **negligible** to **minor** adverse.			
New cable emplacement/ maintenance and EMF	**Offshore**: Under the No Action Alternative, approximately 10,024 miles of offshore export and inter-array cables could be installed along the U.S. East coast to support future offshore wind energy projects. To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss or damage is expected to be long term **moderate** adverse. The impacts of EMF generated by submarine cables on commercial fisheries and for-hire recreational fishing are also expected to be long term but **negligible** to **minor** adverse.	**Offshore**: The installation of the offshore export and inter-array cables could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. To the fullest extent possible, Revolution Wind would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. The impact of submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage is expected to be long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur. EMF levels, which are calculated using conservative assumptions likely to overestimate results, indicate that the magnetic-field and induced electric field produced by the Project cables would be below the detection thresholds for magnetosensitive and electrosensitive marine organisms. Consequently, EMF from Project cables are expected to have long term **negligible** to **minor** adverse impacts on commercial fisheries and for-hire recreational fishing. The cable emplacement/maintenance and EMF impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impact of submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage is expected to be long term **moderate** adverse and the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term **negligible** to **minor** adverse.	**Offshore**: If the number of inter-array cables is reduced under Alternatives C through F, the adverse impact of new cable emplacement on commercial and for-hire recreational fisheries would be diminished during Project construction and O&M. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/damage would be reduced. However, the new cable emplacement and maintenance impact level for commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse where cable burial can occur and long term **moderate** adverse where cable burial cannot occur. Reducing the number of inter-array cables would also decrease the potential adverse impacts of EMF generated by submarine cables on fish and invertebrates targeted by commercial and for-hire recreational fisheries. However, the EMF impact level for commercial fisheries and for-hire recreational fishing would be similar to that for the Proposed Action: long term **negligible** to **minor** adverse for all design configurations analyzed. For all design configurations analyzed, the new cable emplacement and maintenance and EMF impact of Alternatives C through F would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action for all design configurations: long term **negligible** to **minor** adverse for EFH, long term **negligible** to **minor** adverse for cable installation where cable burial can occur; long term **moderate** adverse for cable installation where cable burial cannot occur.			

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Noise	**Offshore**: Construction and O&M activities related to offshore wind energy development that increase underwater noise could result in behavioral responses from some target species. Some sources of noise, such as vessels and pile driving during project construction, could cause some target species to temporarily move away from the source and disperse to other areas. The effects of operational underwater noise from future offshore wind energy projects would occur for the life of the projects but are not anticipated to have population-level effects on target species. For any given offshore wind energy project, all adverse noise impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term during construction and long term during O&M. The intensity of impacts is anticipated to be **moderate** adverse.	**Offshore**: Project construction and O&M activities that increase underwater noise could result in behavioral responses from some target species. Some sources of noise, such as vessels and pile driving during construction, could cause some target species to temporarily move away from the source and disperse to other areas. EPMs, together with an acoustic monitoring plan, are expected to reduce impacts to target species. Therefore, Project construction-related noise is expected to have a short-term **moderate** adverse impact on the target species catch of commercial fisheries and for-hire recreational fishing. Project operational noise could reduce the ability of some target species, like Atlantic cod, haddock, pollock, and hake, to communicate effectively within a few hundred feet of each turbine. Given the small area in which noise impacts would occur, Project-related noise during O&M is expected to have a long-term **moderate** adverse impact on the catch of commercial fisheries and for-hire recreational fishing targeting these species. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. For any given activity, all adverse cumulative noise impacts on the target species catch of commercial and for-hire recreational fisheries are expected to be localized. The noise impacts of the Proposed Action on commercial and for-hire recreational fishing would be undetectable or noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **moderate** adverse.	**Offshore**: By omitting certain WTG positions, Alternatives C through F would reduce the impact of noise on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing. However, the noise impact level for finfish and invertebrates would be similar to that for the Proposed Action. Therefore, for all design configurations analyzed, the impact of noise to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: short term **moderate** adverse during construction and decommissioning and long term **moderate** adverse during O&M. For all design configurations analyzed, the noise impact of Alternatives C through F on finfish and invertebrate resources important to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **moderate** adverse.			
Port utilization	**Onshore**: Offshore wind energy projects would require vessels for staging and installation during construction and for routine maintenance during operations. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. The use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, port utilization impacts to commercial fisheries and for-hire recreational fishing are expected to be localized long term **minor** to **moderate** adverse.	**Onshore**: Several port facilities located in New York, Rhode Island, Massachusetts, and Connecticut are considered for offshore Project construction, staging, and fabrication as well as crew transfer and logistics support. Although final port selection has not been determined at this time, the list of affected commercial ports could include ports used by commercial fishing vessels and for-hire recreational fishing vessels. Vessels for staging and installation during construction would add traffic to port facilities. The additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate**. During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. Given the relatively low number of vessels required for Project O&M, the adverse impacts on the accessibility of port facilities by commercial fishing vessels and for-hire recreational fishing vessels would be long term **minor**. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. The major ports in the GAA are anticipated to continue to have increasing vessel visits, and vessel size is also expected to increase. Future offshore wind	**Onshore**: Construction and O&M of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to commercial fisheries and for-hire recreational fishing in the GAA would be the same as those described for the Proposed Action: short term **minor** to **moderate** adverse to long term **minor** adverse for all design configurations analyzed. For all design configurations analyzed, the port utilization impact of Alternatives C through F to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **minor** to **moderate** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		energy projects, including the Project, would contribute to the increase in vessel traffic. The port utilization impacts of the Proposed Action on commercial and for-hire recreational fisheries would be noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.				
Presence of structures	**Offshore**: The presence of structures can lead to impacts on commercial fisheries and for-hire recreational fishing through habitat conversion, fish aggregation, navigation hazards, allisions, entanglement or gear loss/damage, and space use conflicts. Construction activities related to offshore wind energy development could overlap with the spawning habitat and/or spawning season of a number of species targeted by commercial and for-hire recreational fisheries, leading to potential short-term or long-term **negligible** to **moderate** adverse impacts. Although species that rely on soft-bottom habitat would experience a reduction in favorable conditions, the impacts from structures are not expected to result in population-level impacts. Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a long-term **negligible** to **moderate** adverse effect on the catch of for-hire recreational and commercial fisheries. With respect to impacts to individual fishing operations, those vessels that derive a small percentage of their total revenue from areas where offshore wind facilities would be located or are able to find suitable alternative fishing locations would likely experience long-term **negligible** to **moderate** adverse impacts due to the presence of structures. For those fishing vessels that derive a large percentage of their total revenue from areas where offshore wind facilities would be located, that choose to avoid these areas once the facilities become operational, and are unable to find suitable alternative fishing locations, the adverse impacts due to the presence of structures would be long term **moderate** to **major**. BOEM expects that the impacts resulting from offshore wind energy development would be long term **moderate** to **major** adverse, depending on the fishery and fishing operations. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.	**Offshore**: The installation of offshore Project components, including the WTGs and export cables, could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. To safeguard mariners from the hazards associated with construction of the Project, Revolution Wind will request, and it is expected the USCG will establish, temporary safety zones around each WTG site and each cable-laying vessel. Non-construction vessels would be prohibited from entering into, transiting through, mooring in, or anchoring within the safety zones while construction vessels and associated equipment are working on-site. For those fishing vessels that derive a large percentage of their total revenue from those areas closed during Project construction and are unable to find suitable alternative fishing locations, the adverse impacts of safety zones would be temporarily **major**. However, the majority of fishing vessels derive only a small percentage of their total revenue from areas where safety zones would be in effect. The impacts of safety zones on these fishing vessels are expected to be temporary **negligible** to **moderate** adverse. Considering the moderate revenue of risk across ports, together with the small number of vessels that depend heavily on the Lease Area, the impacts to other fishing industry sectors during Project construction, including seafood processors and distributors and shoreside support services, are expected to be temporary **minor** to **moderate** adverse. The use of the fishing gear conflict prevention and claim procedure for qualifying gear interactions that could occur during construction is considered part of the Proposed Action and would reduce any adverse impacts to temporary **minor**. During Project construction, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be short term **negligible** to **minor** adverse. Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species. The Proposed Action would result in the installation of 100 WTGs and two OSSs. Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15 mile (1 nm) × 1.15 mile (1 nm)–spacing that aligns with other proposed adjacent offshore wind energy projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. However, BOEM is cognizant that maneuverability within the Lease Area could vary depending on factors such as vessel size, fishing gear or method used, and/or environmental conditions.	**Offshore**: See Section 3.9.2.3 for analysis.			

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		The amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the New England and Mid-Atlantic regions as a whole. Nonetheless, for those fishing vessels that derive a large percentage of their total revenue from the Lease Area, choose to avoid the Lease Area during Project O&M, and are unable to find suitable alternative fishing locations, the adverse impacts would be long term **major**. However, three-quarters of the vessels fishing in the Lease Area from 2008 through 2019 derived 0.88% or less of their total revenue from the area. Moreover, some fishing vessels that choose to avoid the Lease Area would likely be able to relocate to other fishing locations and continue to earn revenue. Therefore, the adverse impact of the presence of structures on the majority of vessels would be long term **negligible** to **moderate**. Similar to Project construction, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term **minor** to **moderate** adverse. Revolution Wind would implement a number of measures to reduce entanglement and damage or loss of fishing gear during Project operations and the use of a fishing gear conflict prevention and claim procedure for qualifying gear interactions that could occur is considered part of the Proposed Action and would reduce any adverse impacts to short term **minor**. However, given the small footprint of the Lease Area and RWEC, any localized adverse impacts on target species populations from habitat alteration would have a **negligible** to **moderate** effect on the catch of for-hire recreational and commercial fisheries depending on the species targeted. The WTG and OSS foundations and associated scour protection could also produce an artificial reef effect and attract finfish and invertebrates. Although the effects of artificial reefs on species abundance are uncertain, with respect to the Project, it is expected that the reef effect of the WTG foundations would have long-term **negligible** to **minor** beneficial impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. The potential for disruption of inshore to offshore migratory patterns of important species has been identified as a topic of concern. This potential effect would have long-term **negligible** to **minor** adverse impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations alter the migratory behaviors of targeted species. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. Under the No Action Alternative, offshore wind energy development could result in the installation of 3,008 WTG and OSS foundations through 2030. The impact of the Project would be noticeable as it would add as many as 102 foundations, which is a 3% increase. The addition of these new structures and cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space use conflicts, navigational hazards, entanglement, and gear loss/damage. In the event that these fishing operations are unable to find suitable alternative fishing				

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		locations, they could experience long-term **major** adverse impacts. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Overall, BOEM expects that the cumulative impacts of the presence of structures resulting from the Project and other past, present, and reasonably foreseeable activities would be long term **moderate** to **major** adverse depending on the fishery and fishing operations. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.				
Regulated fishing effort	**Offshore**: Offshore wind energy development could influence regulated fishing effort through two primary pathways: by changing fishing behavior to such an extent that overall harvest levels are not as predicted, and by impacting NMFS ongoing scientific surveys on which management measures are based. Future spatial management measures could change in response to changes in fishing behavior due to the presence of structures. BOEM anticipates that offshore wind energy activities would have **major** adverse effects on NMFS scientific research and protected species surveys, primarily because of the potential impacts of structures to NMFS survey efforts. Implementation of the Federal Survey Mitigation Strategy is expected to reduce potential adverse effects on commercial fisheries and for-hire recreational fishing to long term **moderate**. With respect to reasonably foreseeable activities other than offshore wind energy, proposed fishery management actions include measures to reduce the risk of interactions between fishing gear and NARW. This would likely have a **major** adverse impact on fishing effort in the Lobster and Jonah Crab Fisheries in the GAA. In addition, changing climate and ocean conditions and the resultant effects on species distributions and productivity can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits.	**Offshore**: Given the short (1-year) construction schedule, the Project is not expected to appreciably influence regulated fishing effort. During the construction phase, the Project would not change fishing behavior to such an extent that overall harvest levels are not as predicted. Moreover, Project construction activities are expected to have a short-term **moderate** impact on NMFS ongoing scientific research surveys or protected species surveys as the Project would comply with the mitigation measures set forth in the Federal Survey Mitigation Strategy. Therefore, changes in fishery management measures due to Project construction are expected to have short-term **moderate** adverse effects on commercial fisheries and for-hire recreational fishing. Given the small footprint of the Lease Area and RWEC, Project O&M is not expected to appreciably influence regulated fishing effort. During the operations phase, the Project would not change fishing behavior to such an extent that overall harvest levels are not as predicted. Moreover, Project O&M activities are expected to have a long-term **moderate** adverse impact on NMFS ongoing scientific research surveys or protected species surveys as the Project would comply with the mitigation measures set forth in the Federal Survey Mitigation Strategy. Therefore, changes in fishery management measures due to Project O&M are expected to have long-term **moderate** adverse effects on commercial fisheries and for-hire recreational fishing. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. Overall, the cumulative impacts of regulation of fishing effort to commercial fisheries and for-hire recreational fishing would be the same as under the No Action Alternative: long term **major** adverse.	**Offshore**: For all design configurations analyzed, the regulated fishing effort impact of Alternatives C through F to commercial fisheries and for-hire recreational fishing would be similar to that of the Proposed Action: short term **moderate** adverse during construction and decommissioning and long term **moderate** adverse during O&M. Overall, the cumulative impacts of regulation of fishing effort to commercial fisheries and for-hire recreational fishing would be the same as under the No Action Alternative: long term **major** adverse.			
Vessel traffic	**Offshore**: Construction of offshore wind energy projects would require staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and potentially feeder lift barges and heavy lift barges. A more limited number of vessels would also be required for routine maintenance during the O&M phase. The additional vessel volume could cause vessel	**Offshore**: Construction of the Project would require port facilities for staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and, potentially, feeder lift barges and heavy lift barges. However, the Project-related increase in vessel traffic would be nominal when compared to existing vessel operations within the GAA. In addition, Revolution Wind would implement a comprehensive	**Offshore**: Under Alternatives C through F, vessel traffic would be similar to that for the Proposed Action. Therefore, the impact to commercial fisheries and for-hire recreational fishing in the GAA would be similar to that for the Proposed Action: short term **minor** adverse for construction and decommissioning and long term **minor** to **moderate** adverse for O&M under all design configurations analyzed.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	traffic congestion, difficulties with navigating, and an increased risk for collisions. These potential adverse impacts could cause some fishing vessel operators to change. In addition, once offshore wind energy projects are completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the areas by the prospect of higher catches. Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing are expected to be short term **minor** adverse during construction and long term **minor** to **moderate** adverse during O&M.	communication plan during offshore construction. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be temporary and **minor**. In comparison to the construction phase, Project O&M would require a more limited number of vessels, and the majority of vessels would be smaller in size, although the number of vessel transits would increase during O&M. As a result of a less compressed time period, the increased vessel transits during O&M are not expected to result in a significant increase in the overall traffic volume or patterns. In addition, once the Project is completed, some commercial fishermen could avoid the lease areas if large numbers of recreational fishermen are drawn to the area by the prospect of higher catches. Overall, the vessel traffic effects on commercial fisheries and for-hire recreational fishing during Project O&M are expected to be long term **minor** to **moderate** adverse. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction. Future offshore wind energy projects, including the Proposed Project, would contribute to the increase in vessel traffic, but the risk of vessel collisions is expected to remain low. The vessel traffic impacts of the Proposed Action on commercial and for-hire recreational fishing would be noticeable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.	For all design configurations analyzed, the vessel traffic impact of Alternatives C through F would be similar to that of the Proposed Action (see Section 3.16). Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing in the GAA would be similar to those under the Proposed Action: long term **minor** to **moderate** adverse.			

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3.9.2.2 Alternative B: Impacts of the Proposed Action on Commercial Fisheries and For-Hire Recreational Fishing

3.9.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.1.1), compliance with regulatory requirements would minimize releases of water quality contaminants and trash or debris. Additionally, training and awareness of EPMs proposed for waste management and reduction of marine debris would be required of Project personnel (see Table F-1 in Appendix F). Accidental spill or release of oils or other hazardous materials offshore would be managed through the OSRP. Therefore, during Project construction, the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fishing are expected to be localized **negligible** adverse and short term or long term depending on the type and volume of material released. Details regarding potential water quality impacts to finfish and invertebrates are described in see Section 3.6 and Section 3.13.

Anchoring: Potential impacts from anchoring vessels used in the construction of the Project would be the same as those posed by the No Action Alternative (see Section 3.9.1.1) and are expected to be short term **negligible** to **minor** adverse. Details regarding potential navigation impacts to commercial and for-hire recreational fishing vessels are described in Section 3.16.

Light: Project construction activities that introduce artificial lighting could result in behavioral responses from some target species (see Section 3.6 and Section 3.13). In turn, these responses could decrease the catchability of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Project EPMs include construction vessel light shielding to minimize artificial lighting effects on the environment (see Table F-1 in Appendix F). Project-related lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** to **minor** adverse and short term.

New cable emplacement/maintenance: The installation of the offshore export and inter-array cables could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. These impacts of new cable emplacement to commercial fisheries and for-hire recreational fishing are discussed below under the presence of structures IPF.

Noise: As discussed in the No Action Alternative, Project construction activities that increase underwater noise could cause behavioral responses from some target species (see Section 3.6 and Section 3.13) that could decrease the catchability of target species. According to Revolution Wind, a ramp-up or soft start will be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-driving activities (see Table F-1 in Appendix F). In addition, BOEM will require an adaptive management approach that will require the applicant to prepare an acoustic monitoring plan and, based on the monitoring, require the applicant to avoid activities that would disrupt spawning aggregations of Atlantic cod. If implemented, a restriction on pile-driving activity to times outside the Atlantic cod spawning season would minimize adverse impacts on cod spawning and likely avoid broader population-level effects (see Section 3.13). Therefore, Project-related construction noise is

expected to have a localized **minor** to **moderate** adverse impact on the target species catch of commercial fisheries and for-hire recreational fishing.

Presence of structures: As discussed in the No Action Alternative, the installation of offshore Project components, including the WTGs and export cables, could temporarily restrict vessel movement and thus transit and harvesting activities in the Lease Area and along the RWEC. Construction safety zones implementation dates are pending and would depend on the Project schedule and duration of the expected construction phase. To allow fishing vessels to alter their plans to avoid impacted areas, Revolution Wind would publicize safety zones in advance via a local notice to mariners and would communicate in advance where and when construction activities are scheduled to take place (see Table F-1 in Appendix F).

In addition, if the fishing effort is shifted to areas not routinely fished, conflict with existing users could increase as other areas are encroached. The competition would be higher for fishermen engaged in fisheries with regulations that constrain where fishermen can fish, such as the lobster fishery. The potential for conflict due to fishing displacement is lower among fishermen targeting mobile species such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish. In a given year, however, it is possible that the center of the exploitable biomass, or the portion of a fish population available to fishing gear, of one or more of these species would occur within the Lease Area or along the RWEC during construction. During these occurrences, fishermen could be adversely impacted because of restricted access to the available fish population within the Project construction area. Given the small size of the offshore areas affected during construction, the likelihood of this co-occurrence in time and space is low, as is the likelihood of increased conflict and competition from a temporary displacement of fishing activities.

It is difficult to predict the ability of fishing operations displaced by Project construction activities to locate alternative fishing grounds that would allow them to maintain revenue targets while continuing to minimize costs. However, the available data suggest the presence of alternative productive fishing grounds in proximity to the Lease Area and RWEC. As can be seen in the revenue intensity figures in Appendix G (Figures G-1 through G-13), the revenue intensity levels for many of the FMP fisheries in large expanses of ocean within 20 nm of the Lease Area and RWEC corridor are comparable to or higher than those within the two areas.

Based on data presented in Table 3.9-9 through Table 3.9-16, it is possible to calculate the amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the offshore RWEC. As discussed above, estimates of revenue exposure represent the fishing revenue that would be foregone if fishing vessel operators cannot capture that revenue in a different location. Based on commercial fishing revenue data averaged over the 2008–2019 period, Table 3.9-25 and Table 3.9-26 show the annual revenue at risk in the Lease Area and along the RWEC during each year of the 2-year (2023–2024) Project construction phase by FMP fishery and gear type, respectively. The majority of WTG and RWEC installation is expected in year 2 (2024). The largest impacts in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions or as a percentage of total revenue in the RFA would be in the American Lobster, Sea Scallop, and Mackerel, Squid, and Butterfish FMP fisheries. The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.42 million. The annual exposed revenue represents 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the New England and Mid-Atlantic regions, and 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Mid-

water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA.

Table 3.9-25. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the Revolution Wind Export Cable by Fishery Management Plan Fishery under Alternative B (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$507.7	$283.8	0.30%	3.64%
Atlantic Herring	$273.5	$102.9	0.40%	3.44%
Bluefish	$17.2	$8.7	0.68%	1.50%
Highly Migratory Species	$6.9	$2.2	0.10%	1.00%
Jonah Crab	$40.7	$23.2	0.24%	0.39%
Mackerel, Squid, and Butterfish	$324.4	$145.3	0.28%	0.94%
Monkfish	$210.0	$109.9	0.53%	1.46%
Northeast Multispecies (large-mesh)	$117.0	$52.6	0.07%	2.20%
Northeast Multispecies (small-mesh)	$193.3	$74.3	0.66%	2.63%
Sea Scallop	$409.9	$157.1	0.03%	0.32%
Skates	$175.9	$110.7	1.49%	3.09%
Spiny Dogfish	$35.7	$15.7	0.53%	6.45%
Summer Flounder, Scup, Black Sea Bass	$133.5	$84.3	0.21%	0.77%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species, and non-FMP fisheries	$574.6	$248.0	0.26%	0.73%
All FMP and non-FMP Fisheries	$1,707.8	$1,418.8	0.15%	0.99%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table 3.9-26. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the Revolution Wind Export Cable by Gear under Alternative B (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Dredge-clam	*$399.9*	*$121.1*	*0.20%*	*0.58%*
Dredge-scallop	$417.6	$157.7	0.03%	0.33%
Gillnet-sink	$291.6	$197.4	0.66%	2.05%
Handline	$15.7	$3.7	0.08%	0.27%
Pot-other	$531.2	$345.3	0.30%	2.15%
Trawl-bottom	$658.9	$492.1	0.26%	1.14%
Trawl-midwater	*$191.8*	*$98.1*	*0.52%*	*4.18%*
All other gear*	$288.3	$70.1	0.15%	2.63%
All gear types	$1,707.8	$1,485.6	0.16%	1.03%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table 3.9-27 shows the annual revenue at risk in the Lease Area and along the RWEC during the Project construction phase by port. The largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in the ports of Little Compton (7.4%) and Westport

(5.7%). As shown in Table 3.9-4, the communities in which these ports are located have a low to medium presence of commercial fishing activities.

Table 3.9-27. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative B (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$746.5	$574.2	1.25%	2.08%
New Bedford, MA	$596.2	$369.4	0.10%	0.76%
Little Compton, RI	$219.9	$143.2	7.19%	7.38%
Westport, MA	$121.0	$67.1	5.14%	5.74%
Newport, RI	$194.1	$109.0	1.22%	3.78%
Chilmark/Menemsha, MA	$29.1	$17.1	3.62%	4.06%
Fairhaven, MA	*$29.8*	*$15.5*	*0.14%*	*1.07%*
Montauk, NY	$42.8	$18.8	0.10%	0.16%
Fall River, MA	*$18.2*	*$9.2*	*0.81%*	*2.07%*
Tiverton, RI	*$17.7*	*$7.2*	*0.63%*	*1.11%*
Other Ports, MA	*$16.9*	*$8.2*	*0.01%*	*0.17%*
Point Pleasant, NJ	*$16.8*	*$4.8*	*0.02%*	*0.06%*
Newport News, VA	*$16.2*	*$4.1*	*0.01%*	*0.24%*
Beaufort, NC	*$5.4*	*$2.6*	*0.10%*	*0.31%*
Hampton, VA	*$8.2*	*$3.9*	*0.03%*	*0.25%*
Other New England/Mid-Atlantic ports*	$150.0	$85.1	0.03%	0.28%
All New England/Mid-Atlantic Ports	$1,707.8	$1,439.4	0.15%	1.00%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the RWEC or in the Lease Area.

Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the ability of vessels to adapt to changing where they fish, together with the ecological impact on target species residing within these lease areas (see discussion of potential impacts to target species catch below). Fishing vessel operators could be able

to find suitable alternative fishing locations and continue to earn revenue. However, as noted above, this shift in fishing effort could result in increased operating costs and/or lower revenue. In addition, economic impacts would also depend on the timing of construction activities. Specifically, the time of year during which construction occurs could affect access to fishing areas and availability of targeted fish in the area, which, in turn, could affect catch volumes and fishing revenue.

As described under the No Action Alternative, it is also important to note that there could be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For instance, some fishermen could gain utility from being able to fish in locations that are known to them and also fished by their peers; the presence of other boats in the area can contribute to the fishermen's sense of safety.

The amount of fishing activity that could be affected during Project construction as a result of reduced fishing access is a small fraction of the amount of fishing activity in the New England and Mid-Atlantic regions as a whole. As described above, the annual exposed revenue represents about 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the New England and Mid-Atlantic regions from 2008 through 2019, and about 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Nevertheless, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts as a result of reduced fishing access.

As discussed in Section 3.9.1, an average of 289 vessels per year fished in the Lease Area from 2008 through 2019. A small number of fishing vessels historically derived a large percentage of their total fishing revenue from the area. For example, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 2008–2019 period from the area. If these fishing vessels are unable to find suitable alternative fishing locations when safety zones are in effect during Project construction, the adverse impacts would be temporarily **major**. However, three-quarters of the vessels that fished in the Lease Area derived 0.88% or less of their total annual revenue from the area. Moreover, some fishing vessels would likely be able to relocate to other fishing locations when safety zones are in effect and would continue to earn revenue. Therefore, the majority of fishing vessels are expected to experience temporary **negligible** to **moderate** adverse impacts as a result of the establishment of safety zones during Project construction.

It is estimated that during Project construction the revenue exposure for any given port would not exceed 8% of its total revenue from the Mid-Atlantic and New England regions or from the RFA (see Table 3.9-27). Considering this moderate revenue of risk across ports, together with the small number of vessels that depend heavily on the Lease Area and the ability of vessels to adjust transit and fishing locations to avoid conflicts with construction activities, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, are expected to be temporary **minor** to **moderate** adverse.

Appendix A of the *Fisheries Communication and Outreach Plan* prepared by Orsted U.S. Offshore Wind (2020) presents a fishing gear conflict prevention and claim procedure to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. The use of this procedure for qualifying gear interactions that could occur during construction is considered part of the Proposed Action and would reduce any adverse impacts to commercial or for-hire recreational fishing operations due to fishing gear loss or damage to temporary **minor**.

During Project construction, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be **negligible** to **minor** adverse (see Section 3.6 and Section 3.13). Construction activities that disturb the seafloor could result in the injury or mortality of sedentary species such as sea scallops and surfclams. Given that the area affected by seafloor disturbance would be a fraction of the available habitat, the impact to sedentary species habitat would not be measurably altered compared to the environmental baseline. Therefore, the number of individual organisms affected would also be limited. Moreover, the populations of these species are expected to recover quickly through migration and recolonization from adjacent, undisturbed habitat. Therefore, the adverse impacts to fisheries that target these species would be short term **negligible** to **minor**, depending on the species.

Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term **negligible** to **moderate** adverse impacts to the productivity and recruitment success of these species (see Section 3.6 and Section 3.13). Therefore, the adverse impact on the catch of commercial and for-hire recreational fisheries targeting these affected species would be short term **negligible** to **moderate**, depending on the species. See also noise and light impacts to commercial fisheries and for-hire recreational fishing.

Regulated fishing effort: Given the one-year construction schedule, the Project is not expected to appreciably influence regulated fishing effort as it would not change fishing behavior to such an extent that overall harvest levels are not as predicted. Moreover, Project construction activities are expected to have a short-term **minor** impact on NMFS ongoing scientific research surveys or protected species surveys, as the Project would comply with the mitigation measures set forth in the Federal Survey Mitigation Strategy. Therefore, changes in fishery management measures due to Project construction are expected to have short-term **moderate** adverse effects on commercial fisheries and for-hire recreational fishing.

Vessel traffic: Construction of the Project would involve the same types of vessels and vessel traffic as described in the No Action Alternative (see Section 3.9.1.1). The additional vessel volume in construction ports could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions (see Section 3.16 and Section 3.11). However, the Project-related increase in vessel traffic would be nominal when compared to existing vessel operations within the GAA (vhb 2022). In addition, Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen, of construction activities and vessel movements (see Table F-1 in Appendix F). Communication would be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG) (vhb 2022). As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be temporary and **minor**.

Onshore Activities and Facilities

Port utilization: Several port facilities located in New York, Rhode Island, Massachusetts, and Connecticut are considered for offshore Project construction, staging, and fabrication, as well as crew transfer and logistics support. Although final port selection has not been determined at this time, the list of affected commercial ports could include ports used by commercial fishing vessels and for-hire recreational fishing vessels. For example, fishing ports that could be used during construction and installation, O&M, or decommissioning of the Lease Area or RWEC include Montauk, New London, Point Judith, and New Bedford (vhb 2022). During the facility design report phase, Revolution Wind

would finalize commercial ports to be used to support offshore installation activities for the Lease Area and RWEC.

Vessels for staging and installation during construction would add traffic to port facilities. The additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. These potential adverse impacts could cause some fishing vessel operators to use an alternative port (see Section 3.16 and Section 3.11). As noted above, Revolution Wind would implement a comprehensive communication plan during offshore construction that would reduce the adverse impacts on other users of ports supporting Project construction. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate**.

3.9.2.2.2 Operations and Maintenance and Conceptual Decommissioning

This section focuses on the impacts to commercial fisheries and for-hire recreational fishing during Project O&M. Decommissioning of the Lease Area and RWEC would have similar impacts on commercial fisheries and for-hire recreational fishing as construction. Within 2 years of cancellation, expiration, or other termination of the lease, Revolution Wind would remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seafloor of all obstructions created by activities on the leased area (vhb 2022). Any cut and cleared cables would typically have the exposed ends weighted with clump anchors so that the cables cannot be snagged by fishing gear. Removal of structures that produce an artificial reef effect would result in loss of any beneficial fishing impacts that could have occurred during O&M.

Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.1.1), compliance with regulatory requirements would minimize releases of water quality contaminants and trash and debris. Additionally, training and awareness of EPMs proposed for waste management and reduction of marine debris would be required of Project personnel (see Table F-1 in Appendix F). Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP. Therefore, during Project O&M the impacts of accidental releases and discharges on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** adverse and short term or long term depending on the type and volume of material released. Details regarding potential water quality impacts to finfish and EFH are described in Section 3.13.

Anchoring: Potential impacts from anchoring vessels used during Project O&M would be the same as those posed by the No Action Alternative (see Section 3.9.1.1) and are expected to be short term **negligible** to **minor** adverse. Details regarding potential navigation impacts to commercial and for-hire recreational fishing vessels are described in Section 3.16.

Climate change: As discussed in the No Action Alternative, impacts on commercial fisheries and for-hire recreational fishing in the GAA are expected to result from climate change events. Risks to fisheries associated with these events include habitat and distribution shifts, disease incidence, and risk of invasive species. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located. As the Project becomes operational, the reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would

result in long-term beneficial impacts to fishing operations that target species adversely affected by climate change. However, given the global scale of GHG emissions, the benefits would be **negligible**. Section 3.4 describes the expected contribution of the Project to air emissions and climate change.

Light: Project O&M activities would have the same potential impact as Project construction but at a lower frequency over a longer period. Project EPMs include operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment (see Table F-1 in Appendix F). Project-related lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized **negligible** to **minor** adverse and short term.

New cable emplacement/maintenance and EMF: Assuming two 42-mile-long export cables co-located within a single corridor and 155 miles of inter-array cables (see Section 2.1.2), an estimated 239 miles of offshore export and inter-array cables would be installed to support the maximum-case scenario under the Proposed Action. To the extent feasible, the RWEC, IAC, and OSS-Link Cable would achieve a target burial depth of 4 to 6 feet (1.2 to 1.8 m) below seabed to reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor (vhb 2022). Revolution Wind estimates that 19.5% of the route for each cable comprising the RWEC would require secondary cable protection because burial cannot occur, sufficient burial depth cannot be achieved due to seabed conditions, or to avoid risk of interaction with external hazards (vhb 2022). The impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage are discussed below under the presence of structures IPF.

As discussed in the No Action Alternative, fishermen have raised concerns regarding the behavioral impacts of EMF generated by submarine cables on target fish and invertebrates (BOEM 2018). The Project would employ HVAC transmission (vhb 2022), which generally produces lower intensity EMF than HVDC and may not be as detectable by electrosensitive fish and invertebrate species (see Section 3.6 and Section 3.13). According to Revolution Wind, EMF levels, which are calculated using conservative assumptions likely to overestimate results, indicate that the magnetic-field and induced electric field produced by the Project cables would be below the detection thresholds for magnetosensitive and electrosensitive marine organisms (vhb 2022). Consequently, EMF from Project cables are expected to have the same potential impact as the No Action Alternative; long-term **negligible** to **minor** adverse impacts on commercial and for-hire recreational fisheries.

Noise: As discussed in the No Action Alternative, Project O&M activities that that increase underwater noise could result in behavioral responses from some target species (see Sections 3.6 and 3.13) that could decrease the catchability of target species. In particular, operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock, pollock, and hake, to communicate effectively within a few hundred feet of each turbine. Given the small area in which noise impacts would occur, Project-related O&M noise is expected to have a localized **minor** to **moderate** adverse impact on the catch of commercial fisheries and for-hire recreational fishing targeting these species.

Presence of structures: The presence of the WTGs could result in de facto exclusion if fishing vessel operators are not—or perceive that they are not—able to safely navigate the area around the WTGs.

The amount of commercial fishing revenue that would be annually exposed as a result of O&M activities in the Lease Area and along the RWEC would be the same as the amount exposed during construction. As described above, the largest impacts in terms of exposed revenue as a percentage of total revenue in the

New England and Mid-Atlantic regions or as a percentage of total revenue in the RFA would be in the American Lobster, Sea Scallop, and Mackerel, Squid, and Butterfish FMP fisheries. The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.42 million. The annual exposed revenue represents 0.15% of the average annual revenue for all FMP and non-FMP fisheries in the New England and Mid-Atlantic regions, and 0.99% of the average annual revenue for all FMP and non-FMP fisheries in the RFA. Mid-water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in the ports of Little Compton (7.4%) and Westport (5.7%).

As discussed above, revenue exposure estimates should not be interpreted as measures of actual economic impact. The actual economic impact to commercial fisheries during Project O&M would depend on many factors—foremost, the potential for continued fishing to occur in the Lease Area. It is also important to note that fishermen gain utility from being able to fish in locations that are known to them and are also fished by their peers; the presence of other boats in the area can contribute to the fishermen's sense of safety.

As described above, the amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the entire New England and Mid-Atlantic regions. However, a small number of fishing vessels historically derived a large percentage of their total fishing revenue from the area (see description of the Lease Area and RWEC in Section 3.9.1). For example, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue over the 2008–2019 period from the area. If these vessels choose to avoid the Lease Area during Project O&M and are unable to find suitable alternative fishing locations and continue to earn revenue, the adverse impacts would be long term **major** adverse. However, three-quarters of the vessels that fished in the Lease Area derived 0.88% or less of their total annual revenue from the area. Moreover, some fishing vessels that choose to avoid the Lease Area would likely be able to relocate to other fishing locations and continue to earn revenue. Therefore, the adverse impacts of the presence of structures on the majority of vessels would be long term **negligible** to **moderate**.

It is estimated that during Project O&M, the revenue exposure for any given port would not exceed 8% of its total commercial fishing revenue from the Mid-Atlantic and New England regions or the RFA (see Table 3.9-27). Considering revenue risks across ports with the small number of vessels and fishing activity that would be affected during Project O&M, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term **minor** to **moderate** adverse.

Transmission cable infrastructure could cause a potential safety hazard should gear snag or hook on secondary cable protection. It is possible that cables could become uncovered during extreme storm events or other natural occurrences. Transmission cable infrastructure, together with the scour protection around the monopile foundations, would result in permanent gear impacts if not removed at decommissioning.

As discussed in the No Action Alternative, economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced. Revolution Wind would implement a number of measures to reduce entanglement and damage or loss of fishing gear during Project operations. Revolution Wind

would conduct bathymetry surveys of cable placements to confirm that cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Surveys would be performed 1 year after commissioning, 2 to 3 years after commissioning, and 5 to 8 years after commissioning. Survey frequency thereafter would depend on the findings of the initial surveys (i.e., site seafloor dynamics and soil conditions). A survey could also be conducted after a major storm event (vhb 2022). Decommissioning will involve removing all components in the RWF to a depth of 15 feet (4.6 m) below the mudline (vhb 2022). In addition, Appendix A of the *Fisheries Communication and Outreach Plan* prepared by Orsted U.S. Offshore Wind (2020) presents a fishing gear conflict prevention and claim procedure to be used during O&M and would reduce any adverse impacts to commercial or for-hire recreational fishing operations due to fishing gear damage or loss. As a result of these measures the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage is expected to be long term **negligible** to **minor** adverse where cable burial can occur; long term **moderate** adverse where cable burial cannot occur.

The presence of the WTG foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclams). However, given the small footprint of the Lease Area and RWEC, any localized adverse impacts on target species populations from habitat alteration would have a **negligible** to **moderate** effect on the catch of for-hire recreational and commercial fisheries depending on the species targeted.

As discussed in the No Action Alternative, the effects of artificial reefs on species abundance are uncertain, and aggregation of species could increase the catchability of some target species (Kirkpatrick et al. 2017). Smythe et al. (2021) found that the enhanced fishing experience created by the BIWF led to the establishment of new for-hire recreational fishing businesses and benefited existing ones. With respect to the Project, it is expected that the reef effect of the WTG foundations would have long-term **negligible** to **minor** beneficial impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. Additionally, species could alter their migratory behaviors due to the presence of food or shelter associated with the structures. The potential for disruption of inshore to offshore migratory patterns of important species such as lobster and black sea bass has been identified as a topic of concern (see Section 3.6 and Section 3.13). This potential effect would have long-term **negligible** to **minor** adverse impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations alter the migratory behaviors of targeted species.

Regulated fishing effort: Given the limited footprint of the Lease Area and RWEC, Project O&M is not expected to appreciably influence regulated fishing effort. During the O&M phase, the Project would not change fishing behavior to such an extent that overall harvest levels are not as predicted. Project O&M activities are expected to have a long-term **moderate** impact on NMFS ongoing scientific research surveys or protected species surveys, as the Project would comply with the mitigation measures set forth in the Federal Survey Mitigation Strategy. Therefore, changes in fishery management measures due to Project O&M are expected to have long-term **moderate** adverse effects on commercial fisheries and for-hire recreational fishing.

Vessel traffic: In comparison to the construction phase, Project O&M would require a more limited number of vessels, and the majority of vessels would be smaller in size (vhb 2022). Although the total number of vessel transits would increase during O&M relative to construction, O&M vessel traffic would not have the same influx of vessels during a compressed time period as expected during construction. As

a result, the increased vessel transits during O&M are not expected to result in a significant increase in the overall traffic volume or patterns (vhb 2022) (see Section 3.16).

During Project O&M, some commercial fishermen could avoid the Lease Area if large numbers of recreational fishermen are drawn to the area by the prospect of higher catches due to the artificial reef effect. Overall, the adverse effects of Project O&M to commercial fisheries and for-hire recreational fishing are expected to be long term **minor** to **moderate**.

Onshore Activities and Facilities

Port utilization: During Project O&M port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. The additional vessel volume in ports could cause reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels and for-hire recreational fishing vessels. However, in comparison to the construction phase, Project O&M would require a more limited number of vessels (vhb 2022) (see Section 3.16). Given the relatively low number of vessels, the adverse impacts on the accessibility of port facilities by commercial fishing vessels and for-hire recreational fishing vessels would be long term **minor**.

3.9.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.9.1.1), ongoing and future activities that reduce water quality could in turn decrease species availability and catchability for a fishery over the short term or long term depending on the type and volume of material released.

Compliance with regulatory requirements would effectively minimize releases of water quality contaminants and trash or debris. For this reason, the impacts of accidental releases and discharges of the Proposed Action on the target species catch of commercial and for-hire recreational fisheries would be undetectable. The impacts of the Proposed Action, when combined with the impacts of present and other reasonably foreseeable activities, are expected to be localized **negligible** to **minor** adverse and short term to long term.

Anchoring: Impacts from anchoring due to present and future military, survey, commercial, and recreational activities, including the Proposed Action, could pose a navigational hazard to commercial and for-hire recreational fishing vessels in the GAA. All impacts would be localized (within a few hundred yards of anchored vessel) and temporary (hours to days). The anchoring impacts of the Proposed Action on commercial and for-hire recreational fisheries would be the same as the No Action Alternative (see Section 3.9.1.1) and undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **minor** adverse.

Climate change: The types of impacts from global climate change to commercial fisheries and for-hire recreational fishing described for the No Action Alternative would occur under the Proposed Action (see Table E2-12 in Appendix E1). These impacts are expected to be long term **major** adverse.

As they become operational, future offshore wind facilities, including the Proposed Action, would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities. This

reduction in GHG emissions (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term benefits to fishing operations that target species adversely affected by climate change. However, given the global scale of GHG emissions, the benefits would be **negligible**.

Light: Ongoing and future offshore activities, including the Proposed Action, that introduce artificial lighting could result in behavioral responses from some target species. In turn, these responses could decrease the catchability of target species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. The light impacts of the Proposed Action on commercial and for-hire recreational fisheries would be undetectable. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be short term **negligible** to **minor** adverse.

New cable emplacement/maintenance and EMF: As discussed under the No Action Alternative, offshore wind energy development could result in the emplacement of up to 10,024 miles of offshore export and inter-array cables. The Project would add an additional 239 miles of cable to this total, which is a 2% increase. To the fullest extent possible, future offshore wind energy projects would reduce the occurrence of accidental snagging of fishing gear by burying all cables beneath the seafloor. Therefore, the impact of buried submarine cables to commercial fisheries and for-hire recreational fishing from the Proposed Action would be the same as the impacts from the No Action Alternative: long term **negligible** to **minor** adverse. In areas where cable burial cannot occur, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. Impacts of this transmission cable infrastructure to commercial fisheries and for-hire recreational fishing through entanglement or gear loss/damage and navigation hazards are discussed below under the presence of structures IPF.

Although fishermen have raised concerns regarding the suspected behavioral impacts of EMF generated by submarine cables on target fish and invertebrates, there is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019). Therefore, the impacts of EMF on commercial fisheries and for-hire recreational fishing are expected to be long term **negligible** to **minor** adverse.

Noise: Ongoing and future offshore activities, including the Proposed Action, that increase underwater noise could result in behavioral responses from some target species and decrease the catchability of those species, thereby reducing revenue for commercial fishing and for-hire recreational fishing businesses. Some sources of noise, could cause some target species to temporarily move away from the source and disperse to other areas. These species are expected to return to the area after the noise ends. The effects of operational underwater noise from future offshore wind energy projects would occur for the life of the projects but are expected to be localized and are not anticipated to have population-level effects on target species. The noise impacts of the Proposed Action on the target species catch of commercial and for-hire recreational fisheries would be undetectable and when combined with the impacts of present and other reasonably foreseeable activities, impacts are expected to be long term **moderate** adverse.

Presence of structures: The majority of offshore structures in the GAA would be attributable to the offshore wind industry. As provided in Table E3-1 in Appendix E3 and discussed under the No Action Alternative, offshore wind energy development could result in the installation of 3,008 WTG and OSS

foundations through 2030. The impact of the Project would be noticeable as it would add as many as 102 foundations, which is a 3% increase.

The addition of these new structures and cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space use conflicts, navigational hazards, entanglement, and gear loss/damage. Vessels will have an increasingly difficult time finding new places to fish if displaced by other regional offshore wind energy projects. Therefore, cumulative impacts on fishing operations will increase as more of these projects are developed. Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. If the Project is not included, the total commercial fishing revenue exposed at the end of the Project development timeline for all planned offshore wind energy lease areas in the New England and Mid-Atlantic regions is estimated to be about $34.0 million per year by 2029 (see Table 3.9-22). Based on the data in Table 3.9-9, the Proposed Action would increase the commercial fishing revenue at risk by $1.42 million, which is an increase of approximately 4.2%.

With respect to impacts to individual fishing operations, it is conceivable that some of the small number of fishing operations that derive a large percentage of their total revenue from areas where offshore wind energy facilities would be located would choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term **major** adverse impacts. However, it is expected that most fishing vessels would only have to adjust somewhat to account for disruptions due to the presence of structures. A majority derive a small percentage of their total revenue from any one lease area or would be able to relocate to other fishing locations. In addition, the impacts of offshore wind energy facilities could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect, which would increase the catchability of some target species.

Overall, BOEM expects that the cumulative adverse impacts of the presence of structures resulting from the Project and other past, present, and reasonably foreseeable activities would be long term and **moderate** to **major** depending on the fishery and fishing operations. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects (see BOEM 2022), adverse impacts on commercial fisheries due to the presence of structures could be reduced.

Regulated fishing effort: Offshore wind energy development could influence regulated fishing effort by changing fishing behavior and by impacting NMFS ongoing scientific surveys. BOEM anticipates that reasonably foreseeable offshore wind energy activities could have major adverse effects on NMFS scientific research and protected species surveys. In 2022, NMFS and BOEM developed a draft Federal Survey Mitigation Strategy. Implementation of this strategy is expected to reduce potential effects on commercial fisheries and for-hire recreational fishing, leading to a long-term **moderate** adverse impact level.

For reasonably foreseeable activities other than offshore wind energy, proposed fishery management actions would likely have a long-term **major** adverse impact on fishing effort in the lobster and Jonah crab fisheries in the GAA. In addition, changing climate and ocean conditions can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits.

Overall, the cumulative impacts of regulation of fishing effort to commercial fisheries and for-hire recreational fishing would be the same as under the No Action Alternative: long term **major** adverse.

Vessel traffic: The GAA is expected to continue to have extensive marine traffic related to shipping, fishing, and other activities, and the risk for vessel collisions would be ongoing but infrequent due to the implementation of the *Fisheries Communication and Outreach Plan* prepared by Orsted U.S. Offshore Wind (2020). The vessel traffic impacts of the Proposed Action on commercial and for-hire recreational fisheries would be noticeable, but the risk of vessel collisions is expected to remain low. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.

Onshore Activities and Facilities

Port utilization: The major ports in the GAA are anticipated to continue to have increasing vessel visits, and vessel size is also expected to increase. The increased vessel traffic in ports could result in delays or restrictions in access to ports and increased competition for dockside services. Future offshore wind energy projects, including the Proposed Project, would contribute to the increase in vessel traffic. The port utilization impacts of the Proposed Action on commercial and for-hire recreational fisheries would be noticeable. However, regardless of whether or not the Proposed Project is implemented, most ports are going through continual upgrades and maintenance to ensure that they can receive projected future volumes of vessels. When combined with the impacts of present and other reasonably foreseeable activities, the impacts are expected to be long term **minor** to **moderate** adverse.

Conclusions

Construction and installation, O&M, and decommissioning of the Proposed Action could impact commercial fisheries and for-hire recreational through restricted port access, increased navigational hazards, fishing gear loss/damage, space use conflicts, and reduced catchability of target species. The impacts under the Proposed Action resulting from individual IPFs would range from short term to long term and **negligible** to **major** adverse, with the duration and intensity of impacts varying by Project phase and by fishery and fishing operations due to differences in target species, gear type, and predominant location of fishing activity. With EPMs, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of the Proposed Action could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall long-term **major** adverse impact because some commercial and for-hire recreational fisheries and fishing operations would experience substantial disruptions indefinitely even if remedial action is taken. This impact level is primarily driven by climate change, regulated fishing effort, and the presence of offshore structures. The majority of offshore structures in the GAA would be attributable to the offshore wind industry. Implementation of BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation (BOEM 2022), together with implementation of the Federal Survey Mitigation Implementation Strategy (Hare et al. 2022), would reduce adverse impacts on commercial fisheries and for-hire recreational fishing.

3.9.2.3 Alternatives C, D, E, and F

3.9.2.3.1 Construction and Installation

Offshore Activities and Facilities

Presence of structures: By omitting certain WTG positions, Alternatives C through F would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project construction. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/ damage would be reduced.

Table G-3 through Table G-35 in Appendix G show the estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC under each configuration for Alternatives C through E. Under all design configurations, the largest impacts in terms of exposed revenue as a percentage of total revenue in the RFA would be in the Spiny Dogfish, Atlantic Herring, and American Lobster FMP fisheries.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.33 million under Alternative C1, and $1.27 million under Alternative C2. The annual exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.92% under Alternative C1, and 0.88% under Alternative C2. Mid-water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Point Judith (0.38%), New Bedford (0.24%), and Little Compton (0.09%) under Alternative C1; and Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative C2.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.34 million under Alternative D1, $1.37 million under Alternative D2, $1.35 million under Alternative D3, $1.30 million under D1+D2, $1.27 million under D1+D3, $1.30 million under D2+D3, and $1.23 million under D1+D2+D3. The annual exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.93% under Alternative D1, 0.95% under Alternative D2, 0.94% under Alternative D3, 0.90% under D1+D2, 0.88% under D1+D3, 0.90% under D2+D3, and 0.85% under D1+D2+D3. Mid-water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Point Judith (0.38%), New Bedford (0.24%), and Little Compton (0.09%) under Alternative D1; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D2; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D3; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D2; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D3; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D2+D3; and Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D2+D3.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.06 million under Alternative E1, and $1.17 million under Alternative E2. The annual exposed

revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.74% under Alternative E1, and 0.81% under Alternative E2. Trawl mid-water, "all other," and pot-other gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would as follows: Point Judith (0.31%), New Bedford (0.18%), and Little Compton (0.07%) under Alternative E1; and Point Judith (0.32%), New Bedford (0.21%), and Little Compton (0.08%) under Alternative E2.

The estimated amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC would be lower for all design configurations under Alternatives C through E than under the Proposed Action. However, the amount of exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA under all design configurations would be similar to that for the Proposed Action. In addition, the impact to the revenue of individual fishing operations for all design configurations under Alternatives C through E would be similar to that for the Proposed Action. Therefore, the presence of structure impact level for all design configurations would be similar to that for the Proposed Action: short term **negligible** to **moderate** adverse for the majority of commercial fishing vessels but short term **major** adverse for a small number of vessels.

It is uncertain what WTG positions would be omitted under Alternative F. Consequently, it is not possible to estimate the amount of commercial fishing revenue that would be exposed as a result of construction activities in the Lease Area and along the RWEC under Alternative F. However, the presence of structure impact level for Alternative F is expected to be similar to that for the Proposed Action: short term **minor** to **moderate** adverse.

3.9.2.3.2 Operations and Maintenance and Conceptual Decommissioning

Offshore Activities and Facilities

Presence of structures: By omitting certain WTG positions, Alternatives C through F would reduce the adverse impact of the presence of structures on commercial fisheries and for-hire recreational fishing during Project O&M. In comparison to the Proposed Action, fishing access would be improved and the risk of fishing gear loss/ damage would be reduced.

The amount of commercial fishing revenue that would be exposed as a result of O&M activities in the Lease Area and along the RWEC would be the same as the amount exposed during construction. As described above, under all design configurations, the largest impacts in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions or as a percentage of total revenue in the RFA would be in the Spiny Dogfish, Atlantic Herring, and American Lobster FMP fisheries.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.33 million under Alternative C1, and $1.27 million under Alternative C2. The annual exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.92% under Alternative C1, and 0.88% under Alternative C2. Mid-water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of

total commercial fishing revenue in the RFA would as follows: Point Judith (0.38%), New Bedford (0.24%), and Little Compton (0.09%) under Alternative C1; and Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative C2.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.34 million under Alternative D1, $1.37 million under Alternative D2, $1.35 million under Alternative D3, $1.30 million under D1+D2, $1.27 million under D1+D3, $1.30 million under D2+D3, and $1.23 million under D1+D2+D3. The annual exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.93% under Alternative D1, 0.95% under Alternative D2, 0.94% under Alternative D3, 0.90% under D1+D2, 0.88% under D1+D3, 0.90% under D2+D3, and 0.85% under D1+D2+D3. Mid-water trawl, "all other," and pot gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Point Judith (0.38%), New Bedford (0.24%), and Little Compton (0.09%) under Alternative D1; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D2; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D3; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D2; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D3; Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D2+D3; and Point Judith (0.37%), New Bedford (0.23%), and Little Compton (0.09%) under Alternative D1+D2+D3.

The amount of commercial fishing revenue that would be exposed across all FMP fisheries is estimated to be $1.06 million under Alternative E1, and $1.17 million under Alternative E2. The annual exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA would be 0.74% under Alternative E1, and 0.81% under Alternative E2. Trawl mid-water, "all other," and pot-other gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the RFA. In terms of ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the RFA would be in Point Judith (0.31%), New Bedford (0.18%), and Little Compton (0.07%) under Alternative E1; and Point Judith (0.32%), New Bedford (0.21%), and Little Compton (0.08%) under Alternative E2.

The estimated amount of commercial fishing revenue that would be exposed as a result of O&M activities in the Lease Area and along the RWEC would be lower for all design configurations under Alternatives C through E than under the Proposed Action. However, the amount of exposed revenue as a percentage of the average annual revenue for all FMP and non-FMP fisheries in the RFA under Alternatives C1 and C2 would be similar that for the Proposed Action. In addition, the impact to the revenue of individual fishing operations for all design configurations under Alternatives C through E would be similar to that for the Proposed Action. Therefore, the presence of structure impact level for all design configurations would be similar to that for the Proposed Action: long term negligible to **moderate** adverse for the majority of commercial fishing vessels**,** but long term **major** adverse for a small number of vessels.

As described above, it is uncertain what WTG positions would be omitted under Alternative F. Consequently, it is not possible to estimate the amount of commercial fishing revenue that would be exposed as a result of O&M activities in the Lease Area and along the RWEC under Alternative F.

However, the presence of structure impact level for Alternative F is expected to be similar to that for the Proposed Action: long term **minor** to **moderate** adverse.

3.9.2.3.3 Cumulative Impacts

Offshore Activities and Facilities

Presence of structures: The addition of both new structures and new cables in the GAA could adversely impact commercial fisheries and for-hire recreational fishing due to potential increased space use conflicts, navigational hazards, entanglement, and gear loss/damage. Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in affected areas, and they cannot capture that revenue in different locations. If the Project is not included, the amount of commercial fishing revenue exposed by planned offshore wind energy development in the New England and Mid-Atlantic regions is estimated to be about $34.0 million per year by 2029 (see Table 3.9-22). As described in Section 3.9.2.2.3, the Proposed Action would increase the commercial fishing revenue at risk by $1.42 million, which is an increase of approximately 4.2%.

The Habitat Alternative would increase the commercial fishing revenue at risk by $1.33 million under Alternative C1, and $1.27 million under Alternative C2. These impacts add 3.9% and 3.7%, respectively, to the revenue exposed by planned offshore wind energy development in the New England and Mid-Atlantic regions.

The Transit Alternative would increase the commercial fishing revenue at risk by $1.34 million under Alternative D1, $1.37 million under Alternative D2, $1.35 million under Alternative D3, $1.30 million under D1+D2, $1.27 million under D1+D3, $1.30 million under D2+D3, and $1.23 million under D1+D2+D3. These impacts add from 3.6% (under D1+D2+D3) to 4.0% (under D2) to the revenue exposed by planned offshore wind energy development in the New England and Mid-Atlantic regions.

The Viewshed Alternative would increase the commercial fishing revenue at risk by $1.06 million under Alternative E1 and $1.17 million under Alternative E2. These impacts add 3.1% and 3.4%, respectively, to the revenue exposed by planned offshore wind energy development in the New England and Mid-Atlantic regions.

As described above, it is uncertain what WTG positions would be omitted under Alternative F. Consequently, it is not possible to estimate the amount of commercial fishing revenue that would be exposed as a result of Project activities in the Lease Area and along the RWEC under Alternative F.

Overall, BOEM expects that the cumulative impacts of the presence of structures resulting from all design configurations under Alternatives C through F and other past, present, and reasonably foreseeable activities would be similar to the cumulative impacts under the Proposed Action: long term **moderate** to **major** adverse depending on the fishery and fishing operations. If BOEM's recommendations related to project siting, design, navigation, access, safety measures, and financial compensation are implemented across all offshore wind energy projects, adverse impacts on commercial fisheries due to the presence of structures could be reduced.

3.9.2.3.4 Conclusions

Alternatives C through F under all layout options could result in a lower number of WTGs compared to the maximum scenarios under the Proposed Action, which would decrease navigational hazards, fishing

gear loss/damage, and space use conflicts in commercial and for-hire recreational fisheries. However, BOEM expects for all design configurations analyzed the impacts resulting from individual IPFs would be similar to the Proposed Action: short term to long term and **negligible** to **major** adverse, with the duration and intensity of impacts varying by Project phase and fishery and fishing operations due to differences in target species, gear type, and predominant location of fishing activity. With EPMs, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of Alternatives C through F could include long-term **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse, primarily as a result of climate change, regulated fishing effort, and the presence of offshore structures. The majority of offshore structures in the GAA would be attributable to the offshore wind industry.

3.9.2.4 Mitigation

BOEM has proposed guidance to lessees for mitigating impacts on commercial and recreational fisheries related to project siting, design, navigation, access, safety measures, and financial compensation (BOEM 2022). Together with implementation of the Federal Survey Mitigation Implementation Strategy (Hare et al. 2022), the proposed mitigation measures would reduce adverse impacts on commercial fisheries and for-hire recreational fishing. The proposed mitigation measures are listed in Appendix F, Table F-2 and addressed here in more detail (Table 3.9-28).

Table 3.9-28. Proposed Mitigation Measures – Commercial Fisheries and For-Hire Recreational Fishing

Mitigation Measure	Description	Effect
Compensation for gear loss and damage	The lessee shall implement a gear loss and damage compensation program consistent with BOEM's draft guidance for *Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585* (BOEM 2022) or as modified in response to public comment.	BOEM recognizes that Revolution Wind has an applicable gear loss and damage claims process resulting from survey activities. This measure, if adopted, would be applicable to the IPF presence of structures during both construction and operations. If adopted, this measure would reduce negative impacts resulting from loss of gear associated with uncharted obstructions resulting from the Proposed Action.

Mitigation Measure	Description	Effect
Compensation for lost fishing income	Revolution Wind would implement a compensation program for lost income for commercial and recreational fishermen and other eligible fishing interests for construction and operations consistent with BOEM's draft guidance for *Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585* (BOEM 2022) or as modified in response to public comment.	This measure, if adopted, would reduce impacts from the IPF presence of structures by compensating commercial and recreational fishing interests for lost income during construction and a minimum of 5 years postconstruction. If adopted, this measure would reduce the negligible to major impact level from the presence of structures to negligible to moderate. This is because a compensation scheme will mitigate "indefinite" impacts to a level where the fishing community would have to adjust somewhat to account for disruptions due to impacts but income losses would be mitigated.
Mobile gear–friendly cable protection measures	Cable protection measures should reflect the preexisting conditions at the site.	This mitigation measure, if adopted, ensures that seafloor cable protection does not introduce new hangs for mobile fishing gear (reducing impacts from the presence of structures IPF). Therefore, the cable protection measures should be trawl-friendly with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then Revolution Wind would use materials that mirror that benthic environment.
Post-installation cable monitoring	Revolution Wind must provide BOEM with a cable monitoring report within 45 calendar days following each inter-array and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. In federal waters, the initial inter-array and export cable inspection would be carried out within 6 months of commissioning and subsequent inspections would be carried out at years 1 and 2, then every 3 years thereafter, and after a major storm event. In addition to inspection, the export cable would be monitored continuously with the as-built distributed temperature sensing system.	This mitigation measure, if adopted, ensures that seafloor cables remain buried, reducing impacts from potential gear entanglement and damage.

These measures, if adopted, would have the effect of reducing the overall **negligible** to **major** adverse impact from the Proposed Action to **negligible** to **moderate** adverse. This is driven largely by compensatory mitigation that will mitigate "indefinite" impacts to a level where the fishing community would have to adjust somewhat to account for disruptions due to impacts but income losses would be

mitigated. Other measures will also alleviate some impacts associated with the Proposed Action. The impact levels for Alternatives C through F would also reflect an overall reduction in impacts similar to under the Proposed Action. BOEM anticipates that the overall impacts on commercial fisheries and for-hire recreational fishing associated with the Proposed Action when combined with impacts from ongoing and planned activities including offshore wind would be unchanged (**major** adverse) because some commercial and for-hire recreational fisheries and fishing operations could experience substantial disruptions indefinitely, even with these Project-specific mitigation measures.

3.10 Cultural Resources

The Cultural Resources section addresses marine and terrestrial archaeological and other visually sensitive cultural resources located within the viewshed of Project elements, also referred to as viewshed resources. All other visual (non-historic) resources are addressed in Section 3.20. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties on identified cultural resources, adverse effects, and the resolution of adverse effects.[20] The Project constitutes an undertaking under NHPA Section 106. BOEM is using the NEPA process to substitute for the NHPA Section 106 process on this undertaking, in accordance with the Section 106 implementing regulations, 36 CFR 800 Subpart B, and pursuant to 36 CFR 800.8(c) (see also CEQ and ACHP 2013 and ACHP 2020). The Cultural Resources section discusses potential impacts on cultural resources from the Project, alternatives, and ongoing and planned activities in the cultural resources GAA.

Geographic Analysis Area: The combined GAA for cultural resources (marine, terrestrial, and viewshed), as shown in Figures 3.10-1 through 3.10-4, is equivalent to the Project's area of potential effects (APE), as defined in the Section 106 regulations. In 36 CFR 800.16(d), the APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties," or cultural resources that are eligible for the National Register of Historic Places (NRHP), "if any such properties exist." BOEM (2020) and in Appendix J defines the Project APE as

- the depth and breadth of the seafloor potentially affected by any bottom-disturbing activities, constituting the marine cultural resources portion of the APE;
- the depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial cultural resources portion of the APE;
- the viewshed from which renewable energy structures, whether located offshore or onshore, would be visible, constituting the APE for visual impacts analysis; and
- any temporary or permanent construction or staging areas, both onshore and offshore.

Table E2-9 in Appendix E1 summarizes baseline conditions and impacts to cultural resources, based on IPFs assessed and that would arise from ongoing activities, future non-offshore wind activities, and offshore wind activities.

The phrase *cultural resources* refers to archaeological sites, buildings, structures, objects, and districts, which may include cultural landscapes and traditional cultural properties (TCP). These resources may be historic properties as defined in 36 CFR 800 and may be listed on national, state, or local historic registers or be identified as being important to a particular group during consultation. Federal, state, and local regulations recognize the public's interest in cultural resources. Many of these regulations, including NEPA and the NHPA, require a project to consider how it might significantly affect cultural resources.

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

3.10.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Cultural Resources

This section discusses baseline conditions in the GAA for cultural resources as described in the COP, COP Confidential Appendices M, N, and U2, and supplemental cultural resources studies (i.e., EDR 2021a, 2022; Forrest and Waller 2021; SEARCH 2022). Specifically, this includes terrestrial and offshore areas potentially affected by the proposed Project's land- or seafloor-disturbing activities, areas where structures from the Project would be visible, and the area of intervisibility where structures from both the Project and future offshore wind projects would be visible simultaneously.

Revolution Wind has conducted onshore and offshore cultural resources investigations to identify known and previously unidentified cultural resources within the marine cultural resources, terrestrial cultural resources, and viewshed resources portions of the APE. Table 3.10-1 presents an archaeological summary of the pre-Contact period and post-Contact period cultural context of Rhode Island, Massachusetts, and surrounding areas (Forrest and Waller 2021).

Table 3.10-1. Cultural Resources Context for Rhode Island, Massachusetts, and Surrounding Areas

Period		Years Before Present (B.P.)
Pre-Contact	Ancient (Paleoindian)	13,500–11,000
	Archaic	11,000–3000
	Early Archaic	11,000–9000
	Middle Archaic	9000–6000
	Late Archaic	6000–3000
	Transitional Archaic	3900–2500
	Woodland	3000–450
	Early Woodland	3000–1600
	Middle Woodland	1600–1000
	Late Woodland	1000–450
Post-Contact	Native American, colonial, and U.S. cultural history	450–0

Marine cultural resources review: A marine archaeological resources assessment (MARA) can be found in COP Appendix M.[21] The MARA identified 29 submerged marine cultural resources (SEARCH 2022). Nineteen of these are post-Contact historic shipwrecks or possible shipwrecks. Ten are geomorphic features of ancient submerged landforms. These features consist of discrete and discontinuous locations that may contain preserved evidence of formerly terrestrial landscape features that have survived erosion during the Ancient to Archaic periods of seashore submersion, known as marine transgression, that proceeded over a time frame of several thousand years after the recession of glaciers at the end of the Pleistocene epoch or last Ice Age. Geomorphic features derive their significance from their archaeological

[21] The content of COP Appendix M is considered confidential and is not available for public review.

potential and potential connections to Native American lifeways, such as their potential for pre-Contact cultural resources and their contribution to a broader culturally significant landscape.

Terrestrial cultural resources review: A terrestrial archaeological resources assessment (TARA) can be found in COP Appendix N.[22] The TARA identified four terrestrial cultural resources through Phase I archaeological surveys (Forrest and Waller 2021), which is the initial investigation phase of archaeological survey. These terrestrial cultural resources include a Native American encampment dating to the Archaic and Woodland periods, a Native American encampment with stone tool manufacturing waste materials dating to the Late Archaic or perhaps Early Woodland period, a pre-Contact low density locus of chipped stone manufacture, and a pre-Contact isolated quartz flake produced by stone working.

Viewshed resources review: Two historic resources visual effects assessments (HRVEA) are in in COP Appendix U,[23] one for the viewshed of the onshore Project components and another for the viewshed of the offshore Project components. For the onshore HRVEA, viewshed analyses determined that two viewshed resources—both of which contain historic buildings and structures—are within the viewshed APE (EDR 2021a). From 451 viewshed resources identified within the offshore HRVEA, viewshed analyses found 101 aboveground viewshed resources with the potential to be negatively affected from a moderate to major degree in the viewshed APE (EDR 2022). These moderate to major impacts would rise to a level of adverse effects under the NHPA Section 106 criteria at 36 CFR 800. These 101 viewshed resources consist of two TCPs and 99 historic buildings, structures, or districts (including five National Historic Landmarks [NHLs][24]).

3.10.1.1 Marine Cultural Resources

Geographic analysis area: BOEM (2020) defines the APE for the marine cultural resources GAA (hereafter marine APE) as the depth and breadth of the seafloor potentially impacted by bottom-disturbing activities by the Project (see Figure 3.10-1).

[22] The content of COP Appendix N is considered confidential and is not available for public review.

[23] The content of COP Appendix U is considered confidential and is not available for public review.

[24] The National Park Service (NPS), which administers the NHL program for the Secretary of the Interior (Secretary), describes NHLs and the requirements for NHLs as follows: "National Historic Landmarks (NHL) are designated by the Secretary under the authority of the Historic Sites Act of 1935, which authorizes the Secretary to identify historic and archaeological sites, buildings, and objects which 'possess exceptional value as commemorating or illustrating the history of the United States.' Section 110(f) of the NHPA requires that Federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law requires that agencies, 'to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark.' In those cases when an agency's undertaking directly and adversely affects an NHL, or when Federal permits, licenses, grants, and other programs and projects under its jurisdiction or carried out by a state or local government pursuant to a Federal delegation or approval so affect an NHL, the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL. (NPS 2021)

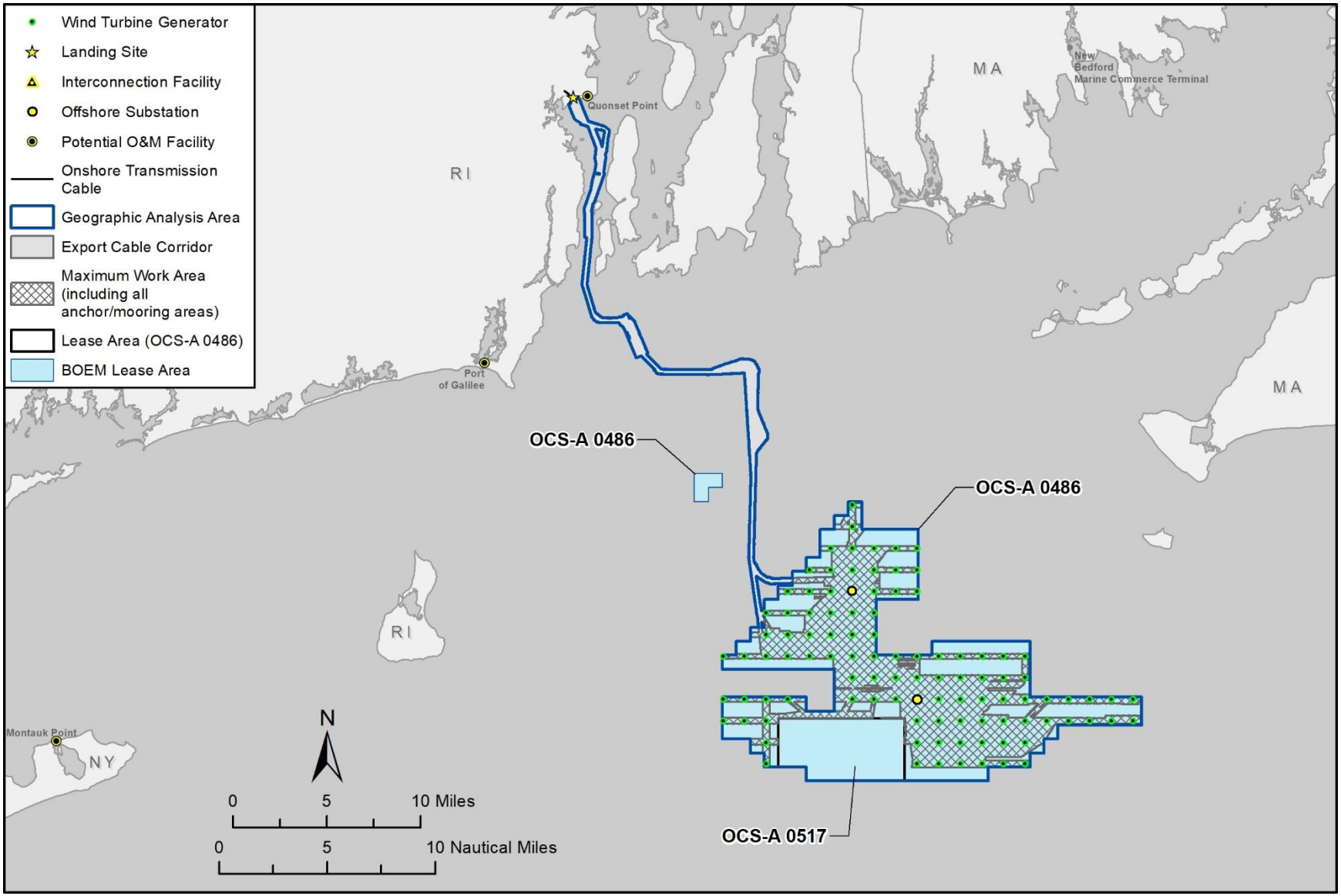

Figure 3.10-1. Marine cultural resources geographic analysis area.

Affected environment: The MARA was conducted on the marine APE between 2017 and 2020 (SEARCH 2022). The high-resolution geotechnical data collected during the marine archaeological survey was used for the geoarchaeological analysis (SEARCH 2022). The survey resulted in the identification of 29 targets of interest within the RWF and RWEC, 19 of which are potential submerged archaeological marine resources and 10 of which are geomorphic features of archaeological interest, associated with ancient submerged landforms (SEARCH 2022). Sixteen of the potential submerged marine cultural resources are located in the RWF and three are located in the RWEC. Five of the geomorphic features of archaeological interest are located in the RWF and five are located in the RWEC.

The 19 potential submerged archaeological marine cultural resources are shipwrecks or possible historic shipwrecks or sunken craft (Table 3.10-2). These shipwrecks may be NRHP-eligible cultural resources, pursuant to 36 CFR 800.16(l), eligible for their potential to contribute important information to archaeological research under NRHP Criterion D at minimum. Any of these resources that are sunken military craft also remain the sovereign property of the U.S. government, subject to the protections of Public Law 108–375 Title XIV—Sunken Military Craft, administered by the Department of the Navy under an overall policy of leaving these crafts and associated remains in place and undisturbed.

The geomorphic features are discrete and discontinuous locations of ancient submerged landforms that may contain preserved evidence of formerly terrestrial landscapes that have survived erosion during marine transgression (Table 3.10-3). Although these features exhibit archaeological potential; no cultural materials associated with the ancient submerged landform features were identified in core samples taken during the submerged cultural resources investigation (SEARCH 2022). These features may derive their significance from reasons other than their archaeological potential, however, such as their potential contribution to a broader culturally significant landscape. Ancient submerged landforms are marine cultural resources of importance to Native American tribes, NRHP eligible at minimum for their connection to broad events within tribal history under NRHP Criterion A and for their ability to contribute further information to the understanding of that history under NHRP Criterion D pursuant to 36 CFR 800.16(l) (SWCA 2021).

Table 3.10-2. Shipwreck Archaeological Sites Identified within the Marine Cultural Resources Geographic Analysis Area

Remote Sensing Target	Location	Target Dimensions (m)	Description
Target 01	RWF	24 × 3.9 × 1.4	Shipwreck
Target 02	RWF	27 × 20 × 0.7	Possible historic shipwreck
Target 03	RWF	7.2 × 0.8 × 0.4	Possible historic shipwreck
Target 04	RWF	3.8 × 2.3 × 0.5	Possible historic shipwreck
Target 05	RWF	Not available (magnetic anomaly)	Possible historic shipwreck
Target 06	RWF IAC	30 × 15 × 1.4	Shipwreck
Target 07	RWF IAC	Not available (magnetic anomaly)	Possible historic shipwreck
Target 08	RWF IAC	28 × 15 × 0.8	Shipwreck
Target 09	RWF IAC	41 × 37 × 1.4	Shipwreck

Remote Sensing Target	Location	Target Dimensions (m)	Description
Target 10	RWF IAC	Not available (magnetic anomaly)	Possible historic shipwreck
Target 11	RWEC	24 × 8.8 × 0.3	Shipwreck
Target 13	RWEC	39 × 15 × 0.6	Possible historic shipwreck
Target 14	RWEC	Not available (magnetic anomaly)	Possible historic shipwreck
Target 15	RWF	Not available (magnetic anomaly)	Possible historic shipwreck
Target 16	RWF IAC	Not available (magnetic anomaly)	Possible historic shipwreck
Target 17	RWF	Not available (magnetic anomaly)	Possible historic shipwreck
Target 18	RWF	Not available (magnetic anomaly)	Possible historic shipwreck
Target 19	RWF IAC	34 × 12 × 1.0	Possible historic shipwreck
Target 20	RWF	16 × 5.5 × 4.5	Possible historic shipwreck

Source: SEARCH (2022:Table 4-1).

Note: No dimensions are available for targets identified on the basis of a magnetic signature. “Target-12” was a probable bridge and not included on that basis. Also, mapped marine resource locations (SEARCH 2022) are confidential and not publicly distributed.

Table 3.10-3. Geomorphic Features Identified within the Marine Cultural Resources Geographic Analysis Area

Geomorphic Feature ID	Location	Description
Target 21	RWEC-RI	Paleochannel with preserved flanks
Target 22	RWEC-RI	Paleochannel with preserved flanks
Target 23	RWEC OCS	Paleochannel with preserved flanks
Target 24	RWF	Paleochannel with preserved flanks
Target 25	RWF	Paleochannel with preserved flanks
Target 26	RWF	Paleochannel with preserved flanks
Target 27	RWF	Paleochannel with preserved flanks
Target 28	RWF	Paleochannel with preserved flanks
Target 29	RWEC-RI	Paleochannel with preserved flanks
Target 30	RWEC-RI	Paleochannel with preserved flanks

Source: SEARCH (2022:Table 4-2).

Note: Mapped ancient submerged landform extents and locations (SEARCH 2022) are confidential and not publicly distributed.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a marine cultural resource that qualify the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible marine cultural resource’s location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that

may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible shipwrecks and ancient submerged landforms would be susceptible to adverse effects from physical destruction of or damage to the historic property by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(i)). Impacts to NRHP-eligible cultural resources that are determined to be **moderate** or **major** as defined in this EIS would rise to the level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources that are determined to be **negligible** or **minor** as defined in this EIS would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

3.10.1.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential marine resource impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non-offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: The accidental release of hazardous materials or debris and any associated cleanup that migrate from future offshore wind activities that are nearby could impact submerged marine cultural resources in the marine APE for the Project. However, most releases would be short term and **negligible** negative and not measurably contribute to resource impacts because of the low probability of occurrence, low persistence time, and EPMs implemented to prevent releases. Although not expected, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive and short- to long-term **minor** to **major** negative impacts on marine cultural resources.

Anchoring: Development of future offshore wind activities is not expected within the Project's marine APE; however, the development of future offshore wind activities could negatively affect marine cultural resources that connect to the current marine APE. At the boundaries of the RWF Lease Area, the SFWF Lease Area does intersect ancient submerged landform features (Targets 27 and 28; see Table 3.10-3) and a shipwreck along the lease edge (Target 20; see Table 3.10-2). Deploying and repositioning anchors with associated wire rope, cable, and chain during construction and maintenance activities could impact the bottom surface and potentially disturb shipwrecks and ancient submerged landforms, resulting in the irreversible loss of cultural resources. The SFWF would avoid impacts to these lease-edge and other marine cultural resources within its lease area by design, but not all marine cultural resources are avoidable within the SFWF export cable corridor (BOEM 2021). Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact within its Lease Area and export cable corridor would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities. For other reasonably foreseeable activities within the Project marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to marine cultural resources could go unmitigated as a result of activities that are not federally reviewed.

Climate change: Factors related to climate change, including sea level rise, increased storm severity/frequency, increased sedimentation and erosion, and ocean acidification, could also result in long-term and permanent impacts on marine cultural resources. Ancient submerged landforms and associated cultural resources on the OCS have already experienced the effects of climate change because they were inundated when the last ice age ended (BOEM 2012:3-423). This includes being exposed to erosion during and after inundation. Climate change could introduce new erosive factors at ancient submerged landforms and shipwrecks. Federal studies on the negative effects of climate change on

shallow water shipwrecks point to accelerated decomposition (National Ocean Service 2021). Conversely, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these climate change impacts and be beneficial to marine cultural resources. Because of this, the Project's contribution to effects from climate change on these resources would be **negligible** negative. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Cable installation from future offshore wind activities and other submarine cables could physically impact marine cultural resources. This includes removal of potential MEC/UXOs in advance of seabed preparation for RWEC installation. In addition to general horizontal acreage of seafloor disturbance, the extent of potential impacts to marine cultural resources increases with depth of disturbance into the seafloor, and cable emplacement and maintenance could reach depths able to impact more shallowly buried ancient submerged landforms, if present, as well as shallowly sediment-covered shipwrecks. The RI-MA WEA contains numerous shipwrecks, related debris fields, and ancient submerged landform features, which future offshore construction activities could impact, as indicated by the MARA and previous wind farm studies in the vicinity (Gray & Pape 2019, 2020; SEARCH 2022). See Figure 1.1-2 for New England WEAs. However, no new cable emplacement or maintenance is anticipated within the current Project's marine APE from future offshore wind activities. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities. For other reasonably foreseeable activities within the Project's marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements. Any sunken military craft and debris fields would continue to be protected under Public Law 108–375 Title XIV. Impacts to other marine cultural resources could go unmitigated as a result of activities that are not federally reviewed.

Presence of structures: Future offshore wind activities could impact marine cultural resources with the placement of in-water structures with foundations in the seafloor. In addition to general horizontal acreage of seafloor disturbance, the extent of potential impacts to marine cultural resources increases with depth of disturbance into the seafloor and WTG and OSS foundations would typically reach depths able to penetrate ancient submerged landforms if present, as well as sediment-covered shipwrecks. The RI-MA WEA contains numerous shipwrecks, related debris fields, and ancient submerged landform features, which future offshore construction activities could impact as indicated by the MARA and previous wind farm studies in the vicinity (Gray & Pape 2019, 2020; SEARCH 2022). However, no new structures are anticipated within the current Project's marine APE from future offshore wind activities or other reasonably foreseeable activities within the Project marine APE that do not require federal approval. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities.

3.10.1.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on marine cultural resources

associated with the Project would not occur. No new structures, cable emplacement, or maintenance activities are anticipated within the Project's marine APE from future offshore wind activities.

Under the No Action Alternative, BOEM anticipates those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities. Marine cultural resources in the marine APE consist of ancient submerged landforms and shipwrecks. Although the effects of climate change would continue on these marine cultural resources in the marine APE, the degree to which the future offshore wind activities analyzed would reduce these impacts is unknown. However, the contribution of offshore wind energy activities, including the Project, to the impacts of climate change would be **negligible**, but the overall impacts of climate change on marine cultural resources would effectively be permanent.

Considering all the IPFs together, BOEM anticipates that no impacts would result from future offshore wind activities in the marine APE. For other reasonably foreseeable activities within the Project marine APE that do not require its federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to marine cultural resources could go unmitigated as a result of activities that are not federally reviewed and therefore could be long term **negligible** to **major** negative.

3.10.1.2 Terrestrial Cultural Resources

Geographic analysis area: BOEM (2020) defines the APE for the terrestrial cultural resources GAA (or terrestrial APE) as the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities by the Project. This includes the areas of the OnSS, ICF, onshore transmission cable corridor, and landfall envelope depicted in Figure 3.10-2.

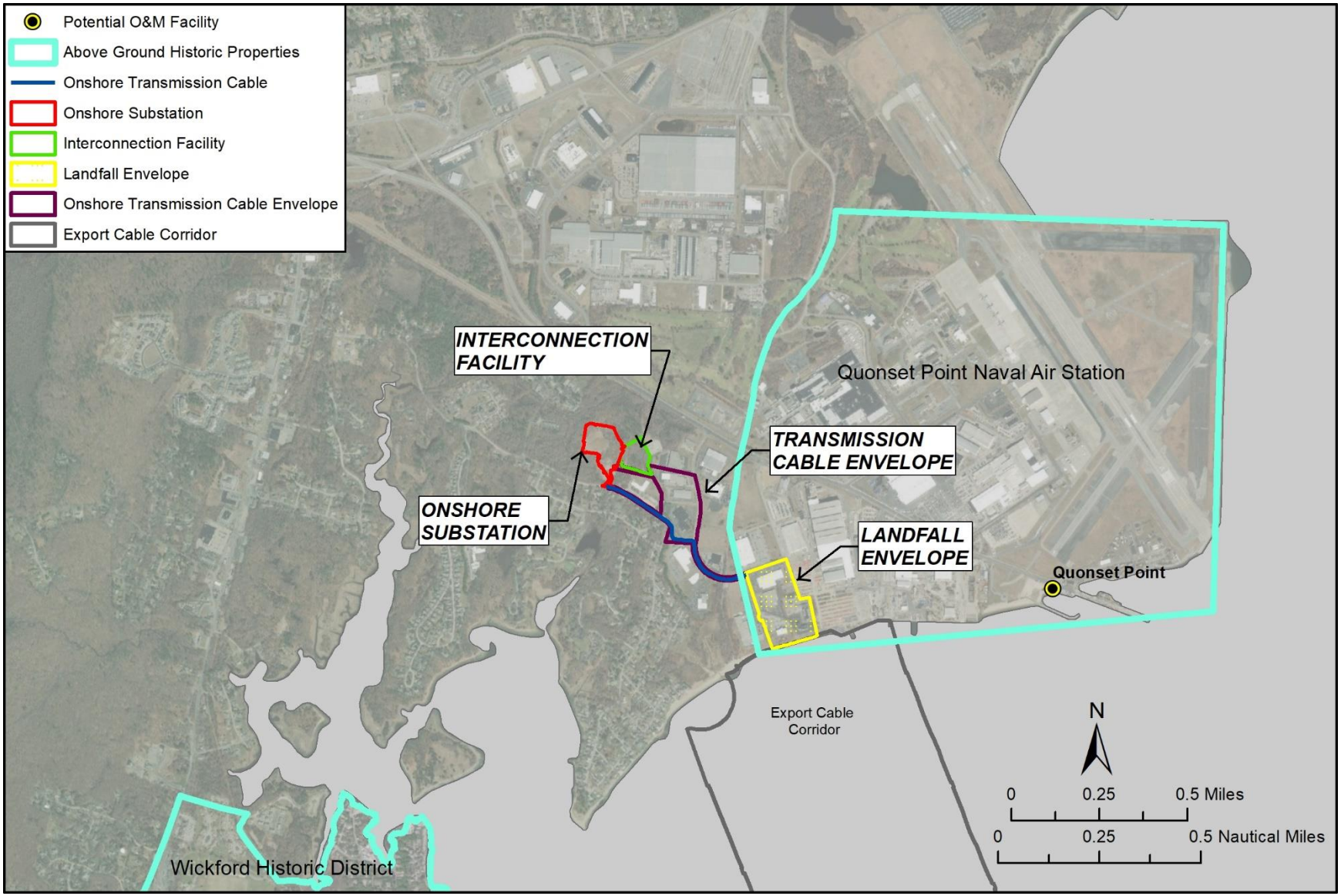

Figure 3.10-2. Terrestrial cultural resources geographic analysis area.

Affected environment: The TARA was conducted within the onshore Project components of the onshore transmission cable, landfall work area, and the OnSS and ICF in 2021 (Forrest and Waller 2021) (see Figure 3.10-2). Construction of onshore Project components could affect terrestrial cultural resources through physical disturbance.

Construction of the OnSS and ICF would collectively require temporary disturbance of approximately 10.9 acres. The maximum depth of disturbance within the OnSS and ICF work area limits is 60 feet. The width of potential ground disturbance for the onshore transmission cable is assumed to be at the extent of the Project easement, which is 25 feet wide centered along the cable route. The preferred onshore transmission cable route is an approximately 1-mile route that will predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable envelope as depicted on Figure 3.10-2. Some of the routes under consideration have segments that would be installed in undeveloped vegetated areas, although they would mostly be installed within paved roads and parking lots (as with the preferred onshore transmission cable route) and would be approximately the same length. Project-related ground disturbance may extend to a maximum depth of 13 feet anywhere within the width of this corridor. Revolution Wind is considering a range of siting options for the RWEC landfall, all of which are encompassed by a 20-acre landfall work area. Within this landfall area, 3.1-acres would be sited, within which ground disturbance associated with the onshore transmission cable construction would occur. As noted above, a preferred route for the onshore transmission cable has been proposed; however, Revolution Wind is considering alternative routing of the onshore transmission cable within the onshore transmission cable envelope, which totals 16.7 acres. Installation of the onshore transmission cable will impact approximately 3.1 acres; therefore, only a portion of the 16.7-acre onshore transmission cable envelope will actually be impacted by installation of the onshore transmission cable. The deepest disturbances within the landfall work area would be associated with the HDD construction method for cable emplacement, which may entail the installation of temporary sheet pile anchor walls driven to a depth of approximately 20 feet. The HDD drill itself may reach a depth of up to 66 feet between the onshore TJBs and the offshore exit pits, but the sediment displacement would be largely confined to the two 3-foot-diameter bore holes. Quonset Point is in an area of concentrated Narragansett Indian settlement specifically associated with the Contact period and extending to the west and southwest of the terrestrial APE (Forrest and Waller 2021). Construction, operation, decommissioning, and large-scale redevelopment of former military facilities at Quonset Point substantially altered the local landscape. Most of the terrestrial APE has been substantially altered by development, demolition, remediation, and associated grading activities postdating 1941. Intact pockets of natural soils represent a small percentage of all surficial earth. The proposed OnSS site was used as a general dump site during naval operations (1940s through 1960s); several hundred tons of debris and soil were removed during remediation activities in the late 1990s. The pockets of relatively intact natural soils within the terrestrial APE are located within the OnSS and ICF work area limits and along the southern margins of the landfall area (Forrest and Waller 2021).

The Public Archaeology Laboratory, Inc. (PAL) contacted the Rhode Island Historic Preservation and Heritage Commission (RIHPHC) and the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head/Aquinnah, Mashpee Wampanoag, Mashantucket Pequot, and Mohegan Tribal Historic Preservation Offices (THPOs) to consider and address tribal concerns within their Phase I survey investigation. Results of the Phase I survey of potentially undisturbed, buried portions of the OnSS and ICF APE by PAL (Forrest

and Waller 2021) resulted in the identification of four archaeological resources. PAL did not conduct remote sensing (ground penetrating radar, soil resistivity, magnetometry, or similar techniques). Dense surface vegetation made remote sensing impractical, and twentieth-century dumping, filling, and other ground disturbances and landscape modifications would have produced inconclusive results. The RIHPHC also does not recognize remote sensing as a reliable method for archaeological site identification, preferring ground-truthing instead to include the excavation of test pits or other excavation units.

The Phase I survey resulted in the identification of two archaeological sites within the OnSS work area limits and one archaeological site and one isolated artifact within the ICF work area limits, named the Quonset Substation archaeological site, the Mill Creek Swamp #1 archaeological site, the Mill Creek Swamp #2 archaeological site, and the QDC Find Spot artifact, respectively (Forrest and Waller 2021). In the OnSS work area limits, the Mill Creek Swamp #1 archaeological site and the Mill Creek Swamp #2 archaeological site are eligible for the NRHP under Criterion D and are archaeologically important (Table 3.10-4). Revolution Wind is committed to avoiding or minimizing impacts to these sites to the best extent feasible. If final OnSS and ICF construction design plans result in impacts to these sites, Revolution Wind will consult with BOEM, other federal and state agencies, and Native American tribes to develop and implement an archaeological mitigation/treatment plan to resolve adverse effects that Project construction would have on the Mill Creek Swamp #1 and Mill Creek Swamp #2 sites. In the ICF work area limits, the Quonset Substation archaeological site is a low-density lithic scatter and the QDC Find Spot artifact is an isolated quartz flake; both resources are not eligible for the NRHP and are not archaeologically important.

Based on data collected during PAL's archaeological monitoring of geotechnical test pits and the Phase I survey at the OnSS and ICF (Forrest and Waller 2021), PAL found that route options within the onshore transmission cable envelope area lack stratigraphic integrity and were determined to not be archaeologically sensitive. Thus, PAL does not recommend further archaeological testing for the potential alternative routing of the onshore transmission cable identified in November 2021.

Table 3.10-4. Terrestrial Cultural Resources within the Terrestrial Cultural Resources Geographic Analysis Area

Terrestrial Cultural Resources	Portion of Project	NRHP Eligibility
Mill Creek Swamp #1	OnSS work area limits	Eligible
Mill Creek Swamp #2	OnSS work area limits	Eligible
Quonset Substation	ICF work area limits	Not eligible
QDC Find Spot artifact	ICF work area limits	Not eligible

Source: Forrest and Waller (2021)

Terrestrial cultural resources, especially archaeological sites, when NRHP eligible, tend to be eligible under Criterion D for their potential to contribute further information important to understanding history. Those that are TCPs, when present, tend to further be eligible under NRHP Criterion A for their important contributions to broad events in tribal history, Criterion B for their connection to important figures in tribal history, and/or Criterion C for their distinctive characteristics of composition.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a terrestrial cultural resource that qualify

the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible terrestrial cultural resource's location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible terrestrial cultural resources, including TCPs, would be susceptible to adverse effects from physical destruction of or damage to the resource by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(i)). Impacts to NRHP-eligible cultural resources that are determined to be **moderate** or **major** as defined in this EIS would rise to the level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources that are determined to be **negligible** or **minor** as defined in this EIS would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

3.10.1.2.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential terrestrial resource impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non-offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: Construction of reasonably foreseeable onshore elements of future offshore wind activities could result in the accidental release of hazardous materials or debris; however, releases would generally be short term, localized, and in limited amounts (see Section 3.10.1). Such an accidental release could result in impacts to terrestrial cultural resources and TCPs associated with the cleanup of contaminated soils. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Archaeological resources and TCPs are more likely to experience indirect physical impacts through damage to or destruction of cultural materials or tribally sensitive resources during the removal of contaminated soils than are aboveground standing structures. Other indirect but primarily short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental releases and discharges. These short-term impacts would be **negligible** to **minor** and minimized or avoided through application of state and local laws and regulations regarding air quality (see Section 3.4.1). No future offshore wind projects other than the RWF are known to have planned development activities or the potential for impacts on terrestrial cultural resources within the terrestrial APE. Beyond the Project's terrestrial APE, impacts to terrestrial cultural resources from other projects' construction-related activities would be short to long term and localized **negligible** to **minor** negative because of the low probability of an accidental release, the low volumes of material typically released in individual incidents, accepted practices used to prevent accidental releases, and the localized nature of such events.

Climate change: As noted for marine cultural resources, climate change is anticipated to also result in long-term **minor** to **moderate** negative permanent impacts on terrestrial cultural resources. Sea level rise could lead to the inundation of terrestrial cultural resources, and increased storm severity and frequency would be expected to increase the severity and frequency of damage to coastal terrestrial cultural resources. Ocean acidification could impact traditional uses of coastal TCPs. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to terrestrial cultural resources. Because of this, the Project's contribution to effects from climate change on these resources

would be long term and **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

Presence of structures: Reasonably foreseeable onshore activities could physically disturb archaeological sites in the terrestrial APE or surrounding areas, such as through new building construction. No historic buildings or structures are located within the terrestrial APE. Future offshore wind activities will not result in onshore facility development in the terrestrial APE. As a result, within the Project's terrestrial APE, impacts to terrestrial cultural resources could be long term **negligible** negative. For other reasonably foreseeable activities within the Project terrestrial APE that do not require federal approval, BOEM would have no ability to add historic preservation requirements, and impacts to terrestrial cultural resources could go unmitigated as a result of activities that are not federally reviewed.

New cable emplacement/maintenance: New cable emplacement could affect terrestrial archaeological resources at onshore cable routes and at the landing site transitioning between onshore and offshore cabling from future offshore wind activities. Although BOEM would be able to add terrestrial cultural resources identification requirements and mitigation measures for future offshore wind projects, the potential for permanent **minor** to **major** negative impacts on buried resources to result from other reasonably foreseeable activities would remain. However, because no future offshore wind activities are being considered within the terrestrial APE of the Project, no potential impacts are expected.

3.10.1.2.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on terrestrial cultural resources associated with the Project would not occur. Examples of individual terrestrial cultural resources are terrestrial archaeological sites and TCPs. Impacts could vary widely because the impacts are dependent on the unique characteristics of the individual resources. However, future offshore wind activities are not known to have impacts occurring in the terrestrial APE of the proposed Project. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be long term **negligible** to **major** negative, where impacts to terrestrial cultural resources could go unmitigated as a result of activities that are not federally reviewed.

Considering all the IPFs together, BOEM anticipates that long-term **negligible** to **major** negative impacts would result only from other ongoing activities, reasonably foreseeable activities other than offshore wind, and reasonably foreseeable environmental trends and not from other future offshore wind activities since none are planned in the terrestrial APE. Where not avoidable, these impacts would be **negligible** to **major** negative on terrestrial cultural resources because they would be irreversible and long term. The NRHP-eligible Mill Creek Swamp #1 and #2 archaeological sites could be subject to future development, potentially without federal historic preservation requirements, even if the proposed Project were not to occur.

3.10.1.3 Viewshed Resources

Geographic analysis area: This section addresses cultural resources located within the viewshed of Project elements. The viewshed includes the onshore and offshore visual effects assessment GAA. The cultural resources within the viewshed, which are typically aboveground historic properties, are referred to herein as viewshed resources. All other visual resources are addressed in Section 3.20.

BOEM defines the APE for visual impact analysis (hereafter the viewshed APE) as the geographic areas from which the offshore and onshore Project components could be seen. Onshore Project components where new development would occur have a viewshed radius of 3 miles around the ICF and OnSS (Figure 3.10-3). The onshore transmission cable and ICF interconnection ROW will be buried, without potential for enduring visual impacts to cultural resources. Onshore components where redevelopment of existing facilities could occur have a viewshed radius of 1 mile around O&M facilities at the Port of Davisville at Quonset Point and Port Robinson (see Figure 3.10-3). However, the 1-mile radius at the Davisville-Quonset Point O&M facility is completely subsumed within the 3-mile radius around the ICF and OnSS. Offshore Project components (e.g., WTGs) have a much larger viewshed radius of 40 miles around the edge of the Lease Area (Figure 3.10-4). The 1-mile, 3-mile, and 40-mile radii represent the maximum limit of theoretical visibility for each respective onshore or offshore Project component; however, these radii do not define the viewshed APE. Within these radii, the APE for viewshed resources is defined by those geographic areas only with a potential visibility of Project components and excludes areas with obstructed views of Project components. Visibility and views of Project components were determined through a viewshed analysis (EDR 2021a, 2022). The viewshed analysis applied GIS modeling to take into account the true visibility of the Project (e.g., visual barriers such as topography, vegetation, and non-historic structures that obstruct the visibility of Project components) (EDR 2021a, 2022) (see Figures 3.10-3 and 3.10-4).

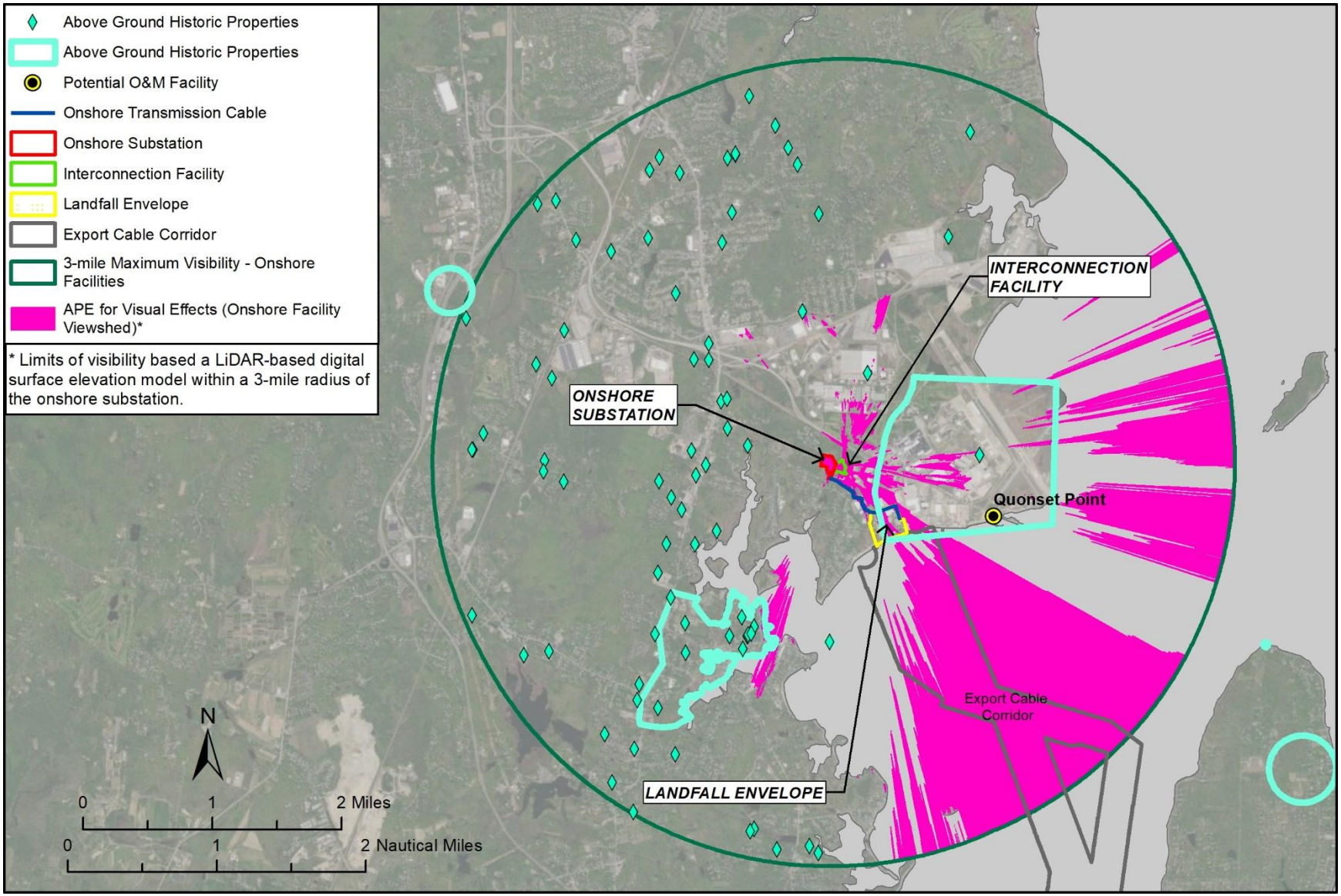

Figure 3.10-3. Viewshed area of potential effects and visual effects assessment geographic analysis area – onshore.

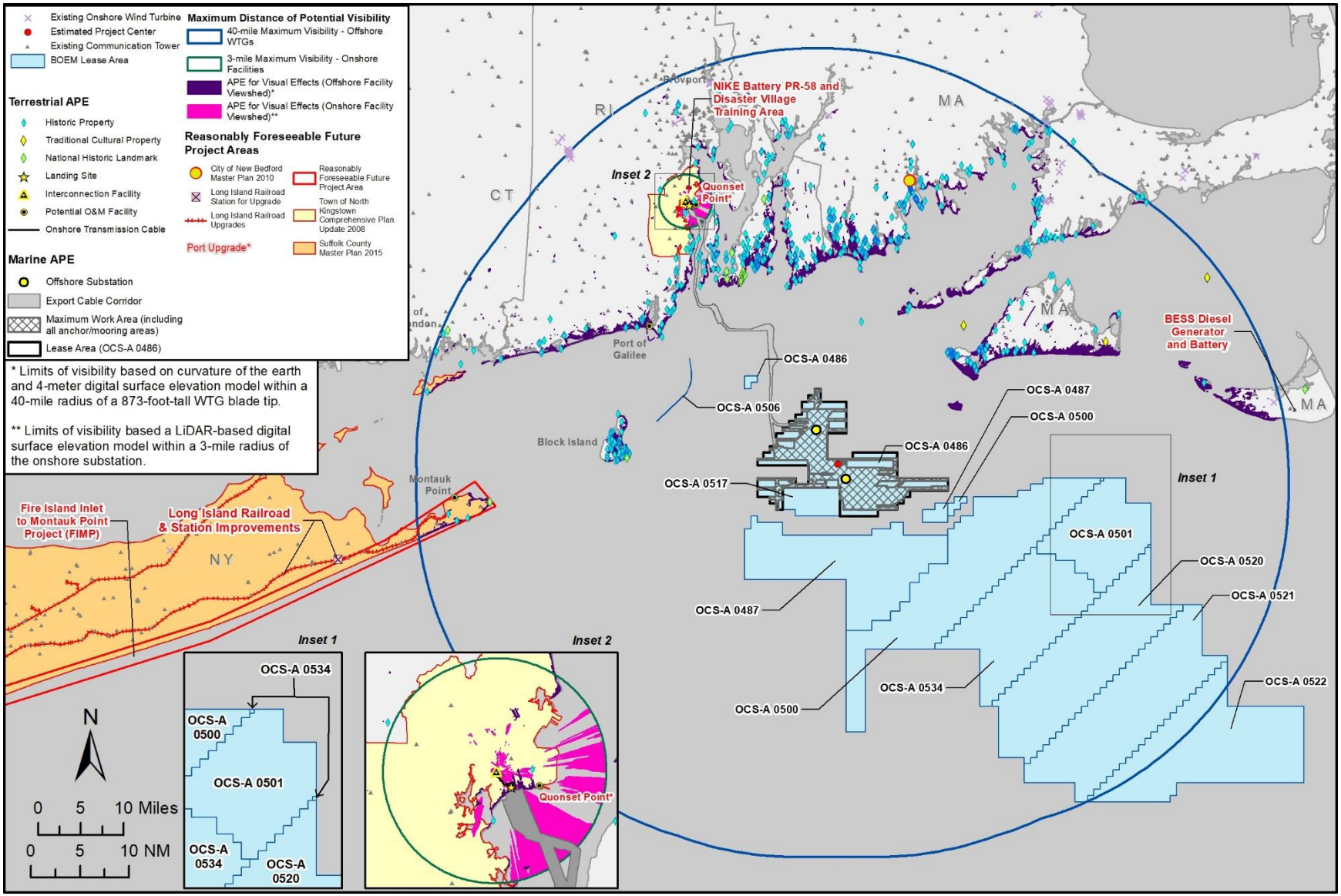

Figure 3.10-4. Viewshed area of potential effects and visual effects assessment geographic analysis area – offshore.

Affected environment: For the onshore components viewshed, the HRVEA identified a total of 80 aboveground viewshed resources, within 3 miles of the proposed OnSS and ICF, that consist of 16 NRHP-listed properties, two properties that have been determined by the RIHPHC to be eligible for the NRHP, nine properties included in the RIHPHC inventory but without formal determinations of NRHP eligibility, and 53 RIHCC-identified Rhode Island Historical Cemeteries (EDR 2021a). Viewshed analyses determined that of these 80 viewshed resources, two are within the viewshed APE (see Figure 3.10-3 and Table 3.10-5). These two resources are located within the viewshed of the OnSS and ICF. The viewshed analysis determined that neither are within the viewshed of any of the five potential O&M facility locations. At 1.1 miles away from the OnSS and ICF location is the NRHP-listed Wickford Historic District; at 0.25 mile away is the Quonset Point Naval Air Station, determined by the State of Rhode Island to be NRHP eligible (EDR 2021a).

Table 3.10-5. National Register of Historic Places–Eligible and Listed Resources within the Viewshed Area of Potential Effects for Onshore Development

Visually Sensitive Resource	Distance to OnSS and ICF (miles)
Wickford Harbor/Wickford Village	1.0
Quonset Point Naval Air Station	0.25

Source: EDR (2021b)

In relation to the offshore Project components, the HRVEA identified a total of 451 aboveground viewshed resources within the viewshed APE that consist of 97 NRHP-listed properties, 69 properties that have been determined eligible for the NRHP, six TCPs, 279 properties included in the RIHPHC and the Massachusetts Historical Commission (MHC) historic inventories but without formal determinations of NRHP eligibility (EDR 2022). Those viewshed resources without formal determinations of NRHP eligibility are treated as NRHP-eligible cultural resources for the purposes of this analysis and compliance with NHPA Section 106.

Twelve of the NHRP-listed viewshed resources are also NHLs (EDR 2022). These are the Montauk Point Lighthouse, Block Island Southeast Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, Marble House, and William Watts Sherman House.

Three resources documented specifically due to their categorization as TCPs consist of the Nantucket Sound TCP, the Chappaquiddick Island TCP, and the Vineyard Sound and Moshup's Bridge TCP. Each of these resources is represented by broad, complex cultural landscapes and connected seascapes (EDR 2022). The Nantucket Sound TCP is NRHP listed and the Chappaquiddick Island TCP and the Vineyard Sound and Moshup's Bridge TCP have previously been determined NRHP eligible by BOEM.

For the offshore components, viewshed analyses for the WTGs and OSSs identified 451 cultural resources that may be eligible for the NRHP. Of these, 101 in the viewshed APE would be subject to potential moderate to major impacts from the Project, rising to the level of adverse effect under the NHPA Section 106 criteria for adverse effects (36 CFR 800.5). NRHP-eligible viewshed resource distribution is mapped on Figure 3.10-4. This analysis assessed the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 873 feet and further considered how distance and curvature of the

Earth affect visibility as space between the viewing point and WTGs increases. The analysis further considered the nighttime lighting of offshore structures during their construction. Of the 101 resources in the viewshed APE that could be susceptible to moderate to major negative visual impacts from the offshore components of the Project, 37 are listed on the NRHP (five of which are also NHLs), 33 have been determined eligible for the NRHP, 31 are included in the RIHPHC and MHC historic inventories but without formal determinations of NRHP eligibility. Two of the cultural resources within the viewshed APE, Chappaquiddick Island TCP and the Vineyard Sound and Moshup's Bridge TCP, are NRHP-eligible TCPs. Table 3.10-6 presents the 101 viewshed resources by order of distance to the nearest Project WTG.

Table 3.10-6. Aboveground Historic Properties where Moderate to Major Visual Impacts Would Potentially Result in Adverse Effects under NHPA Section 106 Criteria

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
Vineyard Sound and Moshup's Bridge	Aquinnah	Dukes	MA	NRHP-eligible resource (BOEM determined)	5
Sakonnet Light Station	Little Compton	Newport	RI	NRHP-listed resource	12.7
Warren Point HD	Little Compton	Newport	RI	NRHP-eligible resource (RIHPHC determined)	12.9
Abbott Phillips House	Little Compton	Newport	RI	RIHPHC historic resource	13.0
Flaghole	Chilmark	Dukes	MA	MHC historic inventory site	13.3
Stone House Inn	Little Compton	Newport	RI	NRHP-listed resource	13.4
Simon Mayhew House	Chilmark	Dukes	MA	MHC historic inventory site	13.5
71 Moshup Trail	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
Vanderhoop, Edwin DeVries Homestead	Aquinnah	Dukes	MA	NRHP-listed resource	13.7
Gay Head - Aquinnah Shops Area	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
Flanders, Ernest House, Shop, and Barn	Aquinnah	Dukes	MA	MHC historic inventory site	13.8
3 Windy Hill Drive	Aquinnah	Dukes	MA	MHC historic inventory site	13.9
Gay Head Light	Aquinnah	Dukes	MA	NRHP-listed resource	13.9
Tom Cooper House	Aquinnah	Dukes	MA	MHC historic inventory site	14
Leonard Vanderhoop House	Aquinnah	Dukes	MA	MHC historic inventory site	14
Theodore Haskins House	Aquinnah	Dukes	MA	MHC historic inventory site	14.1

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
Gay Head - Aquinnah Coast Guard Station Barracks	Aquinnah	Dukes	MA	MHC historic inventory site	14.1
Gay Head - Aquinnah Town Center HD	Aquinnah	Dukes	MA	NRHP-listed resource	14.2
Gooseneck Causeway	Westport	Bristol	MA	MHC historic inventory site	14.8
Gooseberry Neck Observation Towers	Westport	Bristol	MA	MHC historic inventory site	14.8
Spring Street	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	14.9
Capt. Mark L. Potter House	New Shoreham	Washington	RI	RIHPHC historic resource	14.9
Tunipus Goosewing Farm	Little Compton	Newport	RI	NRHP-Eligible Resource (RIHPHC Determined)	15
WWII Lookout Tower – Spring Street	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.1
Westport Harbor	Westport	Bristol	MA	MHC historic inventory site	15.2
Bellevue Avenue HD	Newport	Newport	RI	NHL	15.2
Block Island Southeast Light	New Shoreham	Washington	RI	NHL	15.2
New Shoreham HD	New Shoreham	Washington	RI	Local Historic	15.3
Spring Cottage	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
Old Harbor Hist Dist.	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
Capt. Welcome Dodge Sr.	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
Caleb W. Dodge Jr. House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
Spring House Hotel	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4
Pilot Hill Road and Seaweed Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4
Ocean Drive HD	Newport	Newport	RI	NHL	15.7
Marble House	Newport	Newport	RI	NHL	15.7
Ochre Point – Cliffs HD	Newport	Newport	RI	NRHP-listed resource	15.8

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
WWII Lookout Tower at Sands Pond	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.8
Sea View Villa	Middletown	Newport	RI	RIHPHC historic resource	15.9
Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House	Newport	Newport	RI	NRHP-listed resource	15.9
The Breakers	Newport	Newport	RI	NHL	15.9
Corn Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.9
Clam Shack Restaurant	Westport	Bristol	MA	MHC historic inventory site	15.9
Horseneck Point Lifesaving Station	Westport	Bristol	MA	MHC historic inventory site	15.9
Whetstone	Middletown	Newport	RI	RIHPHC historic resource	16.0
The Bluff/John Bancroft Estate/ Purgatory Chasm	Middletown	Newport	RI	NRHP-eligible resource (RIHPHC determined)	16.0
Clambake Club Of Newport	Middletown	Newport	RI	NRHP-listed resource	16.0
Old Town and Center Roads	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.0
Beach Avenue	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
Mitchell Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
Indian Head Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
Westport Point Revolutionary War Properties	Westport	Bristol	MA	MHC historic inventory site	16.2
Stonybrook HD (Indian Avenue HD)	Middletown	Newport	RI	NRHP-listed resource	16.2
St. Georges School	Middletown	Newport	RI	NRHP-listed resource	16.3
Hygeia House	New Shoreham	Washington	RI	NRHP-listed resource	16.3
US Weather Bureau Station	New Shoreham	Washington	RI	NRHP-listed resource	16.3

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
Miss Abby E. Vaill/ 1 of 2 Vaill cottages	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
Hon. Julius Deming Perkins/Bayberry Lodge	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
Lakeside Drive and Mitchell Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC Determined)	16.5
Land Trust Cottages	Middletown	Newport	RI	NRHP-eligible resource (RIHPHC determined)	16.6
Russell Hancock House	Chilmark	Dukes	MA	MHC historic inventory site	16.6
Westport Point HD (1)	Westport	Bristol	MA	NRHP-eligible resource (MHC Determined)	16.7
Westport Point HD (2)	Westport	Bristol	MA	NRHP-listed resource	16.7
Mohegan Cottage / Everett Barlow House	New Shoreham	Washington	RI	NRHP-eligible Resource (RIHPHC determined)	16.7
Paradise Rocks HD	Middletown	Newport	RI	RIHPHC historic resource	16.8
Lewis-Dickens Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.0
Island Cemetery/Old Burial Ground	New Shoreham	Washington	RI	RI Historical Cemetery	16.8
Kay St.-Catherine St.-Old Beach Road HD / The Hill	Newport	Newport	RI	NRHP-listed resource	16.9
Beacon Hill Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.9
Nathan Mott Park	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.1
Champlin Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.1
Block Island North Lighthouse	New Shoreham	Washington	RI	NRHP-listed resource	17.1
Hippocampus/Boy's camp/Beane Family	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.2
US Lifesaving Station	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
US Coast Guard Brick House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
Peleg Champlin House	New Shoreham	Washington	RI	NRHP-listed resource	17.5

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
Hancock, Captain Samuel - Mitchell, Captain West House	Chilmark	Dukes	MA	NRHP-eligible resource (MHC determined)	17.6
Scrubby Neck Schoolhouse	West Tisbury	Dukes	MA	MHC historic inventory site	18.0
Point Judith Lighthouse	Narragansett	Washington	RI	NRHP-listed resource	18.2
Bailey Farm	Middletown	Newport	RI	NRHP-listed resource	18.3
Beavertail Light	Jamestown	Newport	RI	NRHP-listed resource	18.4
Horsehead/Marbella	Jamestown	Newport	RI	NRHP-listed resource	18.6
Ocean Road HD	Narragansett	Washington	RI	NRHP-listed resource	18.9
Dunmere	Narragansett	Washington	RI	NRHP-listed resource	19.1
Puncatest Neck HD	Tiverton	Newport	RI	RIHPHC historic resource	19.4
Fort Varnum/Camp Varnum	Narragansett	Washington	RI	NRHP-eligible resource (RIHPHC determined)	19.6
Salters Point	Dartmouth	Bristol	MA	MHC historic inventory site	19.7
Dunes Club	Narragansett	Washington	RI	NRHP-listed resource	19.8
Life Saving Station at Narragansett Pier	Narragansett	Washington	RI	NRHP-listed resource	19.8
The Towers HD	Narragansett	Washington	RI	NRHP-listed resource	19.8
Narragansett Pier MRA	Narragansett	Washington	RI	NRHP-listed resource	19.8
The Towers / Tower Entrance of Narragansett Casino	Narragansett	Washington	RI	NRHP-listed resource	19.9
Chappaquiddick Island TCP	Edgartown	Dukes	MA	NRHP-eligible resource (BOEM determined)	20
Brownings Beach HD	South Kingstown	Washington	RI	NRHP-listed resource	21.8
Tarpaulin Cove Light	Gosnold	Dukes	MA	NRHP-listed resource	22.2
Clark's Point Light	New Bedford	Bristol	MA	NRHP-listed resource	24.6
Fort Rodman	New Bedford	Bristol	MA	NRHP-eligible resource (MHC determined)	24.6
Fort Taber HD	New Bedford	Bristol	MA	NRHP-listed resource	24.6
744 Sconticut Neck Rd.	Fairhaven	Bristol	MA	MHC historic inventory site	25.9

Visually Sensitive Resource	Municipality	County	State	Resource Designation	Distance to nearest WTG (miles)
Butler Flats Light Station	New Bedford	Bristol	MA	NRHP-listed resource	25.6
Nobska Point Lighthouse	Falmouth	Barnstable	MA	NRHP-Listed resource	28.0

Source: EDR (2022): Attachment A.
Note: HD = Historic District, MA = Massachusetts, RI = Rhode Island.

The identified viewshed resources susceptible to visual impacts tend to be those eligible for the NRHP under Criterion C for their distinctive characteristics of construction or composition or additionally under Criterion A for their important contributions to broad events in history. TCPs tend to further be eligible for the NRHP under Criterion B for their connection to important figures in tribal history and under Criterion D for their potential to contribute further information important to understanding tribal history. NHLs have elevated recognition for their exceptional significance at the national level representing an outstanding aspect of American history and culture. NHLs are further treated under the special requirements of NHPA Section 110(f) and 36 CFR 800.10 to minimize harm to them. NRHP-eligible viewshed resources identified as susceptible to visual impacts within the viewshed APE retain important historic settings that contribute to the resources' NRHP eligibility along with other aspects of integrity.

The Project and other ongoing and reasonably foreseeable activities would result in an adverse effect when it alters, directly or indirectly, any of the characteristics of a viewshed resource that qualify the resource for the NRHP in a manner that would diminish the integrity of the NRHP-eligible viewshed resource's location, design, setting, materials, workmanship, feeling, or association per 36 CFR 800.5(a)(1). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). NRHP-eligible aboveground cultural resources would be susceptible to adverse effects that diminish the integrity of the resource's significant historic features from the introduction of visual elements by the Project or other ongoing and reasonably foreseeable activities (36 CFR 800.5(a)(2)(v)). Larger-scale historic properties (e.g., expansive TCP landscapes and historic districts that contain multiple integral sites and features) are more likely to have views of Project elements and to have views of more Project structures and lighting than smaller individual historic properties, based on the results of the HRVEA (EDR 2022); although, greater quantities of individual historic properties are located in the viewshed APE and, therefore, would be exposed to visual impacts in greater numbers. Impacts to any NRHP-eligible cultural resource, including viewshed resources, that are determined to be **moderate** or **major** as defined in this EIS, would rise to level of adverse effect per the criteria of adverse effect under NHPA Section 106. Impacts to cultural resources, that determined to be negligible or **minor** as **defined** in this EIS, would not rise to the level of adverse effects under the criteria of adverse effect under NHPA Section 106.

3.10.1.3.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential viewshed resource impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non-offshore wind activities is provided in Appendix E1.

Climate change: The effects of climate change on viewshed resources would be similar to those noted for marine and terrestrial cultural resources. Increased erosion along coastlines could lead to the collapse of coastal viewshed resources and elements of TCPs included among the viewshed resources. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to viewshed resources by hindering changes to the shoreline settings important to these resources. Because of this, the Project's contribution to effects from climate change on these resources would be long term **negligible** negative. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: Future offshore wind activities would impact viewshed resources in the long term from navigational and aviation lighting on structures and in the short term from construction lighting. Impacts from lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of cultural resources would be affected and would include those for which the nighttime sky is a contributing element to historic integrity, such as resources on the shores of Rhode Island and Massachusetts and their offshore islands. Future offshore wind activities could locate WTGs a minimum of 11.3 miles from Nomans Land Island, 15.0 miles from Martha's Vineyard, 16.8 miles from Nantucket Island, 16.9 miles from Block Island, 23.1 miles from mainland Rhode Island at Point Judith, 24.5 miles from Newport, and 30.5 miles from Long Island. The distances between the areas with viewshed resources and the nearest offshore wind lighting sources would reduce the intensity but not eliminate negative lighting impacts at all viewshed resources. The intensity of lighting impacts would also be reduced by the number, luminosity, and proximity of existing light sources near the resources (building and streetlights, onshore vehicle and offshore vessel lights). The intensity of lighting impacts would further be limited by atmospheric and environmental conditions (clouds, fog, and waves) that could partially or completely obscure or diffuse sources of light from offshore and onshore wind Project components. Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Under the No Action Alternative, lighting from future offshore wind activities would have short-term to long-term **negligible** to **major** negative impacts on viewshed resources.

Presence of structures: For the onshore viewshed APE, if BOEM selects the No Action Alternative, the development of future offshore wind projects' onshore infrastructure (the presence of structures) could introduce new visible elements to the setting of viewshed resources that would compromise their historic integrity, where there is an unimpeded line of sight from the viewshed resource to the onshore infrastructure. Within the offshore viewshed APE, the maximum-case scenario of 955 WTGs from all other future offshore wind activities (as modeled for viewshed resources [EDR 2021c]) would have a greater visual impact on most locations within the viewshed APE upon full build-out than would the RWF alone with its up to 100 WTGs. Far more of the 451 NRHP-eligible viewshed resources (including 12 NHLs) identified in the viewshed APE would be negatively affected from a moderate to major degree by future offshore wind projects collectively than the 101 NRHP-eligible viewshed resources (including five NHLs) anticipated to be adversely affected (as defined under the NHPA Section 106 regulations at 36 CFR 800.5). Cumulative effects from the additive visual effects that would occur across future offshore

wind projects. Under the No Action Alternative, the construction, installation, and O&M of future offshore wind activities could locate WTGs in the viewshed APE. Beginning at approximately 11 miles from NRHP-eligible viewshed resources at Nomans Land Island and extending to over 30 miles at NRHP-eligible viewshed resources at Long Island, New York, and mainland Connecticut, impacts from future offshore wind projects would result in long-term **negligible** to **major** negative visual impacts to NRHP-eligible viewshed resources in the viewshed APE. These impacts would be short term from construction vessels and long term from O&M vessels, and minimized with distance and intervening factors such as atmospheric haze, angle of view of the viewshed resource, and other screening elements in the environment, such as trees and buildings or structures. Decommissioning would remove the visual impacts of the Project.

3.10.1.3.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on viewshed resources associated with the Project would not occur. However, ongoing and future activities would continue to have short to long-term **negligible** to **major** negative impacts on viewshed resources, primarily through the presence of structures and lighting that would be readily visible from these resources during the day and at night.

BOEM anticipates that the range of impacts for future offshore wind activities would be long term **negligible** to **major** negative, depending on the scale and extent of impacts and the unique characteristics of the viewshed resource. Examples of individual viewshed resources are historic aboveground structures and TCPs. Impacts vary widely because the impacts are dependent on the unique characteristics of the individual resources. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be long-term **negligible** to **major** negative, for similar reasons.

Considering all the IPFs together, BOEM anticipates that long-term **negligible** to **major** negative impacts would result from future offshore wind activities in the viewshed APE when combined with ongoing activities and reasonably foreseeable activities other than offshore wind. This is because, where not avoidable, the overall impact on viewshed resources would be long term and potentially permanent.

3.10.2 Environmental Consequences

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

Impacts on cultural resources—marine, terrestrial, and viewshed resources—are based on up to 100 WTGs and two OSSs, for a total of up to 102 foundations in the analysis area, the maximum-case scenario for foundation structures and connecting cables and infrastructure or facilities as considered in the PDE. Appendix D presents additional information on the PDE and maximum-case scenario.

If Revolution Wind instead installed fewer than 100 WTGs and WTGs larger in size than 8 MW, then potential variances in impacts would be anticipated. If 12-MW WTGs were to be installed, then the maximum height of the blade tip for WTGs would be 873 feet above the surface, compared to 696 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, the FAA specifies additional mid-tower lighting, in addition to lighting at the top of the nacelle (FAA 2018). The taller WTGs and additional

lighting would result in greater visual impacts within the viewshed APE, somewhat but not entirely offset by fewer WTGs being needed. The selection of a higher capacity turbine within the PDE (up to a 12-MW WTG) would proportionately reduce the number of WTGs and associated IAC in the Lease Area and increase the ability for the Project to avoid impacts to submerged marine cultural resources when compared to the 8-MW WTG option.

See Appendix E1 for a summary of IPFs analyzed for cultural resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have only a negligible potential for negative effects are excluded from Chapter 3 and provided in Appendix E1:Table E2-9. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.10-7 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations.

The impact of any alternative would be **negligibl**e to **major** negative, depending on whether resources are unavoidable or discovered during Project activities or have unobscured views of Project structures. If previously undiscovered or unimpacted historic are identified and moderate to major negative effects cannot be avoided, BOEM would require a post-review discovery plan (see Appendix J) be implemented to assess and resolve any negative effects. NRHP-eligible cultural resources, if adversely affected, would be mitigated through the NHPA Section 106 process.

The impacts would be relatively uniform between the action alternatives, except the Viewshed Alternative, where setbacks of WTGs from Martha's Vineyard and adjacent areas of mainland Rhode Island at Newport County (Aquidneck Island) would provide advantages for avoiding and reducing **moderate** to **major** negative impacts to marine cultural resources and viewshed resources over the other action alternatives.

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Table 3.10-7. Alternative Comparison Summary for Cultural Resources

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Marine Cultural Resources						
Accidental releases and discharges	The accidental release of hazardous materials or debris and any associated cleanup that migrate from future offshore wind activities that are nearby could impact submerged marine cultural resources in the marine APE for the Project. Although not expected, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive and short- to long-term **minor** to **major** negative impacts on marine cultural resources.	**Offshore**: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. The risk would be increased primarily during construction but also would be present during operations and decommissioning. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects accidental releases and discharges would have localized short-term **negligible** impacts on marine cultural resources. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable activities would be expected to have short-term **negligible** to **minor** cumulative impacts to marine cultural resources.	**Offshore**: Impacts from accidental releases and discharges from Alternatives C through F on marine cultural resources would be similar to those described for the Proposed Action due to the similarity in Project activities and associated spill risks. Any spills from construction and O&M activities associated with Alternatives C through F would occur infrequently at discrete locations and vary widely in space and time. As a result, impacts from accidental releases and discharges are anticipated to be localized and short term **negligible**. Likewise, short-term **negligible** to **minor** cumulative impacts to marine cultural resources are anticipated.			
Anchoring	The development of future offshore wind activities could negatively affect marine cultural resources that connect to the current marine APE. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact within its Lease Area and export cable corridor would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities.	**Offshore**: Vessel anchoring would be associated with seafloor disturbance activities (short and long term) proposed for the Project consisting of clearing/leveling of the seafloor, monopile foundation (and associated cable protection) construction, export cable installation, and OSS-link cable and IAC installation (preparation, trenching, burial, maintenance, replacement, etc.). Anchoring disturbance would affect up to 3,178 acres of the seafloor under the maximum case scenario (see Table E4-1). The impacts to marine cultural resources would be irreversible and **major** negative unless all NRHP-eligible marine cultural resources and marine cultural resources significant to Native American tribes can be avoided during anchoring. The MARA identified 29 marine cultural resources within the RWF and RWEC, 19 of which are potential shipwrecks and 10 of which are ancient submerged landform features of significance to Native American tribes. Revolution Wind would be expected under any BOEM approval of the COP to conduct O&M activities on equipment in areas that have been surveyed and found to contain no marine cultural resources and/or in areas that have previously experienced disturbance during construction. Therefore, impacts of anchoring on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M activities. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be **negligible** over the long term.	**Offshore**: Alternatives C through F would involve the same types or numbers of marine cultural resources at the RWF and RWEC offshore development areas as under the Proposed Action (see Figure 3.10-1). However, these alternatives could decrease the risk of disturbance and impacts to marine cultural resources because the number of constructed WTGs may be reduced and associated cable trenching may also decrease, resulting in greater Project flexibility for avoiding these resources. Therefore, vessel anchoring would result in less seafloor disturbance than is anticipated for the Proposed Action. The decreased number of WTGs anticipated for these alternatives would also reduce the length of IAC required and therefore reduce the acreage of seafloor disturbed by anchors during construction and installation. Potential anchorage disturbance is expected to reduce from the 3,178 acres under Alternative B to 2,062–2,093 acres under Alternative C, 2,496–2,961 acres under Alternative D, 2,062 or 2,589 acres under Alternative D, and as little as 1,814 acres under Alternative F (see Table E4-1). Compared to the Prosed Action, Alternative C would place WTG locations farther from seven of the 29 marine cultural resources, specifically 2.8 to 3.0 miles farther from ancient submerged landforms (Targets 28 and 27, respectively) and 0.25 mile to 2.5 miles farther from shipwrecks (Targets 2, 8, 17, 18, and 19, in order of increasing distance). Distances to other ancient submerged landforms and shipwrecks would not change under Alternative C. Alternative D could decrease the risk of disturbance and impacts at one potential shipwreck (Target 04) because the nearest WTG would be sited approximately 3.5 miles more distant from that shipwreck. Impacts would remain the same as the Proposed Action, however, if Alternative D retains WTG proximity to that shipwreck. As a result, Alternative D would not have the potential to reduce anchoring impacts at marine cultural resources as much as Alternative C (for progressive comparison to the other action alternatives, see Section 3.10.2.5). Alternative D would also maintain similar configurations to the Proposed Action at the other 28 marine cultural resources in the marine APE.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
			Compared to the Proposed Action, the 64 WTG turbine configuration of Alternative E1 would place WTG locations farther from seven of the 29 marine cultural resources, consisting of two ancient submerged landforms (Targets 24 and 26), three known shipwrecks (Targets 01, 06, and 09), and two possible shipwrecks (Targets 07 and 16). Compared to the Proposed Action, the 81 WTG turbine configuration of Alternative E2 would place WTG locations farther from two marine cultural resources, consisting of one ancient submerged landform (Target 24) and one possible shipwreck site (Target 09). Either configuration of Alterative E would have more potential for anchoring impacts at marine cultural resources than Alternative C but less potential for anchoring impacts than either Alternative D or the Proposed Action. However, Alternative E increases the distance of Project WTGs to a different range of marine cultural resources than either Alternative C or Alternative D. Alternative E would result in similar impacts to the Proposed Action at the 22 to 27 marine cultural resources in the marine APE where its configurations do not provide farther avoidance distances. Vessel anchoring associated with Alternative F, which combines alternative WTG reduction options, would result in less seafloor disturbance than is anticipated for the Proposed Action or, potentially, the other action alternatives. Alternatives C through F would use the same RWEC as that of the Proposed Action. These alternatives would result in irreversible and **major** negative impacts to NRHP-eligible marine cultural resources if these resources could not be avoided during construction of the RWEC. Due to the similarity in Project activities and locations, the impacts of anchoring on identified marine cultural resources and ancient submerged landforms from O&M and decommissioning activities associated with Alternatives C through F would be similar to the Proposed Action. The impacts of anchoring or use of a jack-up barge on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M, because O&M activities would be restricted to areas that have been surveyed and found to contain no marine cultural resources or that have previously experienced disturbance during construction. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be long term **negligible** to **minor**. The reduced scale of Alternatives C through F would result in fewer potential impacts from seafloor disturbance activities than the Proposed Action. Anchoring from other future wind energy activities is not expected in the marine APE for the current Project; however, anchoring from other reasonably foreseeable non-wind activities in the marine APE could impact marine cultural resources. Should these impacts be added to by unavoidable impacts on marine cultural resources under Alternatives C through F, anchoring would result in irreversible and **negligible** to **major** negative cumulative impacts on marine cultural resources.			
Climate change	The contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these climate change impacts and be beneficial to marine cultural resources. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate	**Offshore**: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative. The Proposed Action's contribution to effects from climate change on these resources would be **negligible** and impacts from climate change are anticipated to remain **minor** to **moderate** negative. Cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of this Project since the ongoing effects of climate change on marine cultural	**Offshore**: Impacts from climate change on marine cultural resources from Alternatives C through F would be similar to those described for the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	change on marine cultural resources would remain effectively permanent and therefore long term.	resources would remain effectively permanent and therefore long term.				
New cable emplacement/ maintenance	Cable installation from future offshore wind activities and other submarine cables could physically impact marine cultural resources. However, no new cable emplacement or maintenance is anticipated within the current Project's marine APE from future offshore wind activities. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by other reasonably foreseeable offshore wind activities.	**Offshore**: Installation of the IAC, OSS-link cable, and RWEC would impact the seafloor within the Lease Area and along the RWEC route. This includes from potential MEC/UXOs removal in advance of seabed preparation for RWEC installation. The construction and installation footprint for the RWEC would impact 1,390 acres of the seafloor (see Table E4-1). The operational footprint for the RWEC is calculated at 8,349 acres, and the cable would be emplaced to depths of up to 13 feet below the seafloor (see Table 2.1-3). The IAC and OSS-link cable would be emplaced at depths of up to 10 feet below the seafloor and require up to 2,619 acres of horizontal seafloor disturbance. Revolution Wind recommended a 50-m (164-foot) avoidance buffer on the 19 targets identified as shipwreck archaeological sites. Where Revolution Wind would avoid the shipwreck sites by a distance of 50 m (164 feet), the Project would have no impact on them. If these shipwreck and ancient submerged landforms are determined eligible for the NRHP and they cannot be avoided by new cable emplacement, then the impacts would be irreversible and **major** negative. Although no new cables would be emplaced during O&M or decommissioning, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the IAC, OSS-link cable, and RWEC over the life of the Project. As a result, O&M and decommissioning activities related to cables are expected to result in long-term **negligible** to **minor** impacts to marine cultural resources. Cable installation from the Proposed Action, future offshore wind activities, and other submarine cable activities could impact marine cultural resources. Cable emplacement and maintenance from future offshore wind activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to the general impacts from Project cabling. Cumulative impacts from the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** for the long term.	**Offshore**: Cable emplacement for Alternatives C through F could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternatives C through E would be the same as the Proposed Action, but the acreage of the IAC emplaced would be reduced due to the reduction in WTGs installed under Alternatives C through F. As noted in the discussion of anchoring impacts above, Alternative C would place the WTGs and their connecting IAC farther from two ancient submerged landforms and five shipwrecks than the Proposed Action by placing WTGs 0.25 to 3.0 miles farther away. Where Alternative C is able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in and increased distances from cable emplacement, Alternative C would have less impacts on marine cultural resources than the Proposed Action. Alternative D would either avoid one or more shipwreck site(s) or, dependent on WTG configuration, have the same potential impacts on marine cultural resources as compared to the maximum-case scenario under the Proposed Action. In either case, Alternative D would not have the potential to reduce impacts from cable emplacement at marine cultural resources as much as Alternative C. Alternative E would place the WTGs and their connecting IAC farther from one to two ancient submerged landforms and one to five shipwreck sites than the Proposed Action by placing WTGs 0.8 to 4.4 miles farther away. Either analyzed configuration of Alterative E would have the potential to increase cable emplacement impacts at marine cultural resources compared to Alternative C and to reduce the potential for cable emplacement impacts in comparison to Alternative D and the Proposed Action; although, Alternative E increases distance of Project WTGs to a different range of marine cultural resources than either Alternative C or Alternative D. The acreage of seafloor impacts associated with the installation of the RWEC and IAC under Alternative F would be somewhat less than the Proposed Action, but that cannot be quantified until the WTGs to be removed are identified. The acreage of the IAC emplaced would be reduced due to the reduction in WTGs installed under Alternative F. If Alternative F is able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in cable emplacement, then Alternative F could have less impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from cable emplacement would be irreversible and long term **negligible** to **major** negative. Although no new cables would be emplaced during O&M or decommissioning activities for Alternatives C through F, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the RWEC over the life of the Project. As noted for the Proposed Action, it is expected that most, if not all, of the bottom disturbance associated with O&M and decommissioning would be located within previously disturbed areas. Avoidance or mitigation measures that were implemented for construction would be employed should activities extend outside previously disturbed areas (vhb 2022:552). For these reasons the potential impacts to marine cultural resources from cable maintenance under Alternatives C through F are similar to the Proposed Action for O&M and decommissioning and would be irreversible and long term **negligible** to **minor**.			

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			Cable emplacement under Alternatives C through F could impact marine cultural resources. The acreage of seafloor impacts associated with the RWEC under Alternatives C through F would be the same as the Proposed Action, but the acreage of IAC emplaced would be less due to the reduction in WTGs installed under Alternatives C through F. Where Alternatives C through F are able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action, Alternatives C through F would have less impact on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from cable emplacement and maintenance would be irreversible and long term **negligible** to **major** negative. Similar to the Proposed Action, cable emplacement and maintenance from future wind energy activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to Alternatives C through F. Cumulative impacts from any action alternative for the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** for the long term.			
Presence of structures	Future offshore wind activities could impact marine cultural resources with the placement of in-water structures with foundations in the seafloor. However, no new structures are anticipated within the current Project's marine APE from future offshore wind activities or other reasonably foreseeable activities within the Project marine APE that do not require federal approval. Under the No Action Alternative, those marine cultural resources that the RWF has the potential to impact would be avoided and would result in no impacts by future offshore wind activities.	**Offshore**: Placement of the WTGs and OSSs would impact the seafloor within the Lease Area. The Project anticipates impacting up to 734.4 acres of seafloor for construction of the up to 100 WTG and up to two OSS locations (see Table E4-1). For shipwreck and ancient submerged landforms determined NRHP eligible and that can be avoided by the placement of WTGs and OSSs, the impacts would be long term **negligible**. Revolution Wind recommended a 50-m (164-foot) avoidance buffer for shipwrecks. If the shipwreck and ancient submerged landforms are determined NRHP eligible, and they cannot be avoided by construction of structures, then the impacts would be long term **major** negative. O&M and decommissioning activities at WTG and OSS structures would be located within previously disturbed areas or surveyed areas outside of identified marine cultural resources are expected to result in long-term **negligible** to **minor** impacts. Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area. Other future offshore wind energy activities would not place structures in the RWF Lease Area. Based on these factors, cumulative impacts from the Project in relation to other future offshore wind energy activities would be **negligible** for the long term.	**Offshore**: The elimination of WTGs under Alternatives C through F would reduce seafloor impacts over the Proposed Action. See anchoring and new cable emplacement/maintenance impacts, above, for analysis of the placement of WTGs (and the IACs that connect to them) relative to NRHP-eligible shipwreck sites and ancient submerged landforms. Potential construction disturbance for WTG and OSS locations is expected to reduce from the 734.4 acres under Alternative B to 475.2–482.4 acres under Alternative C, 576–84 acres under Alternative D, 475.2–597.6 acres under Alternative D, and as little as 417.6 acres under Alternative F (see Table E4-1). Where Alternatives C through F are able to avoid more NRHP-eligible shipwreck sites and ancient submerged landforms than the Proposed Action through a reduction in seafloor disturbance and increased distances from Project structures, these alternatives would have less impacts on marine cultural resources than the Proposed Action. Where NRHP-eligible shipwreck sites and ancient submerged landforms remain unavoidable by Alternatives C through F, impacts from Project structures would be irreversible and long term **negligible** to **major** negative. It is expected that O&M and decommissioning activities at the WTG and OSS structures under Alternatives C through F would be similar to the Proposed Action. As a result, the impacts to marine cultural resources from the presence of structures under Alternatives C through F would be similar to the Proposed Action and remain long term **negligible** to **minor**. Although Alternatives C through F would have reduced impacts to marine cultural resources over the Proposed Action, other future offshore wind energy activities would not place structures in the RWF Lease Area, and therefore the cumulative effects of Project structures on marine cultural resources would be the same under Alternatives C through E as the Proposed Action. The cumulative impacts to marine cultural resources from the Project in relation to other future offshore wind energy activities would be **negligible** for the long term.			
Terrestrial Cultural Resources						
Accidental releases and discharges	Construction of reasonably foreseeable onshore elements of future offshore wind activities could result in the accidental release of hazardous materials or debris; however, releases would generally be short term, localized, and in limited amounts (see Section 3.10.1). Such an accidental release could	**Onshore**: Construction of onshore Project elements could result in the accidental release of hazardous materials or debris; however, releases would generally be short term, localized, and in limited amounts. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release,	**Onshore**: Impacts from accidental releases and discharges from onshore Project activities or facilities on terrestrial cultural resources under Alternatives C through F, if any, would be the same as those described for the Proposed Action. Such impacts would be short term, localized, and in limited amounts to terrestrial cultural resources. Indirect physical impacts would be long term **negligible** to **major** negative, and indirect short-term impacts related to cleanup activities would			

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	result in impacts to terrestrial cultural resources and TCPs associated with the cleanup of contaminated soils. No future offshore wind projects other than the RWF are known to have planned development activities or the potential for impacts on terrestrial cultural resources within the terrestrial APE. Beyond the Project's terrestrial APE, impacts to terrestrial cultural resources from other projects' construction-related activities would be short to long term and localized **negligible** to **minor** negative because of the low probability of an accidental release, the low volumes of material typically released in individual incidents, accepted practices used to prevent accidental releases, and the localized nature of such events.	its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Other indirect but primarily short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental releases and discharges. These short-term impacts would be **negligible** to **minor** negative and minimized or avoided through application of state and local laws and regulations. The impacts from accidental releases and discharges resulting from Project O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project construction and installation. Indirect physical impacts would be long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. The Proposed Action would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The risk of impact from accidental releases and discharges would be increased primarily during construction but also would be present during Project operations and decommissioning. Releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized short-term **negligible** negative cumulative impacts on terrestrial cultural resources within the terrestrial APE.	be **negligible** to **minor** negative and minimized or avoided through the application of state and local laws and regulations. The impacts from accidental releases and discharges resulting from O&M and decommissioning activities associated with Alternatives C through F would be the same as those described for the Proposed Action and No Action Alternative. The overall magnitude of potential impacts resulting from accidental releases and discharges would be long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Similar to the Proposed Action, Alternatives C through F would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. Within the terrestrial APE, no contribution is anticipated from other future offshore wind activities. Releases from other future development activities, if any, or ongoing use and maintenance of the historic Quonset Point Naval Air Station, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and short term **negligible** cumulative impacts on terrestrial cultural resources at the Quonset Point Naval Air Station.			
Climate change	As noted for marine cultural resources, the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown. Impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.	**Onshore**: The impacts of the Proposed Action would be the same as the No Action Alternative as relates to climate change. The contribution of the Project on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to terrestrial cultural resources. Because of this, the Proposed Action's contribution to effects from climate change on these resources would be **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term. Cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative.	**Onshore**: Impacts from climate change on terrestrial cultural resources under Alternatives C through F would be similar to those described for the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in long-term **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative.			
Presence of structures	Reasonably foreseeable onshore activities could physically disturb archaeological sites in the terrestrial APE or surrounding areas, such as through new building construction. No historic buildings or structures are located within the	**Onshore**: The construction of onshore Project components would physically disturb two NRHP-eligible archaeological sites within the OnSS work area limits; one NRHP-ineligible archaeological site and one NRHP-ineligible isolated archaeological artifact within the ICF work area limits; and the grounds of one aboveground historic property, the Quonset Point Naval Air Station area (Forrest and Waller 2021).	**Onshore**: The onshore activities proposed under Alternatives C through F would be the same as those under the Proposed Action. Therefore, the potential for permanent **negligible** to **major** negative impacts to result from the presence of structures under Alternatives C through F on terrestrial cultural resources is anticipated.			

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	terrestrial APE; although the terrestrial APE intersects a portion of the historic Quonset Point Naval Air Station area. Future offshore wind activities will not result in onshore facility development in the terrestrial APE. As a result, within the Project's terrestrial APE, impacts to terrestrial cultural resources could be long term **negligible** negative.	Physical impacts to the historic Quonset Point Naval Air Station resources would be **negligible** to **minor** because no terrestrial cultural resources that contribute to the NRHP-eligibility of that aboveground historic property are anticipated in the terrestrial APE. Physical impacts would also be **negligible** to **minor** at the portions of the two archaeological sites within the OnSS work area limits where construction is able to avoid physical impacts and **moderate** to **major** negative in areas where construction is not able to avoid physical impacts to them. Overall, the potential is for permanent **negligible** to **major** negative impacts to result from the Project on terrestrial cultural resources. O&M and decommissioning activities would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 archaeological survey work. Physical impacts to these resources would be short to long term **negligible** negative where avoided by O&M and decommissioning activities and long term **minor** to **major** negative where ground-disturbing activities are not able to avoid these impacts. No future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of onshore structures under the Proposed Action would result in long-term **negligible** negative cumulative impacts within the terrestrial APE.	The impacts from the presence of structures on terrestrial cultural resources resulting from O&M and decommissioning activities associated with Alternatives C through F would be the same as those described for the Proposed Action. Overall, the potential is for permanent, **negligible** to **major** negative impacts. Project impacts would be **negligible** to **minor** where construction is able to avoid portions of the two NRHP-eligible archaeological sites and **moderate** to **major** negative where construction is not able to avoid these impacts. Similar to the Proposed Action, under Alternatives C through F, no future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of onshore structures under any action alternative would result in long-term **negligible** cumulative impacts within the terrestrial APE.			
New cable emplacement/ maintenance	New cable emplacement could affect terrestrial archaeological resources at onshore cable routes and at the landing site transitioning between onshore and offshore cabling from future offshore wind activities. Although the potential for permanent **minor** to **major** negative impacts on buried resources to result from other reasonably foreseeable activities would remain (see Appendix E), no future offshore wind activities are being considered within the terrestrial APE of the Project. Therefore, no potential impacts are expected.	**Onshore**: The impacts from new cable emplacement and maintenance for the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE. The route selected for the onshore transmission cable is located within existing ROWs and would minimize impacts to, or avoid, potential terrestrial cultural resources, to the extent practicable. The risk of potentially encountering undisturbed archaeological deposits is minimized in these areas, and the resultant impact to terrestrial cultural resources would be long term **negligible** to **minor** negative. O&M and decommissioning activities associated with the Proposed Action for the onshore cable would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 archaeological survey work. Consequently, long-term **negligible** negative impacts would occur to terrestrial cultural resources during O&M and decommissioning activities. Within the Project's terrestrial APE, no future offshore wind projects other than the RWF are expected to have development activities and impacts on terrestrial archaeological resources. The impacts from new cable emplacement/maintenance under the Proposed Action would result in long-term **negligible** cumulative impacts.	**Onshore**: The onshore activities proposed under Alternatives C through F would be the same as those under the Proposed Action. Therefore, impacts to terrestrial cultural resources from construction, O&M, and decommissioning of cable emplacement/maintenance would be long term **negligible** to **minor** as the risk of potentially encountering undisturbed archaeological deposits is minimal in these previously disturbed areas. Within the terrestrial APE, no impacts from new cable emplacement/maintenance under any future offshore wind activities are anticipated. The impacts from new cable emplacement/maintenance under any action alternative would result in long-term **negligible** cumulative impacts.			

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Viewshed Resources						
Climate change	The effects of climate change on viewshed resources would be similar to those noted for marine and terrestrial cultural resources. Increased erosion along coastlines could lead to the collapse of coastal viewshed resources and elements of TCPs included among the viewshed resources. However, the contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help reduce these potential negative impacts and be beneficial to viewshed resources by hindering changes to the shoreline settings important to these resources. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.	**Offshore**: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative. The Project's contribution to effects from climate change on these resources would be **negligible**. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term. Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative: **minor** to **moderate** and long term.	**Offshore**: Impacts of Alternatives C through F as they relate to climate change would be similar to the Proposed Action. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as **minor** to **moderate** negative and long term. Renewable energy development by the Project under any action alternative and future offshore wind activities are anticipated to reduce the impacts of climate change to an unknown degree, but offshore wind development alone is anticipated to result in **negligible** contributions to impacts from climate change. Therefore, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative. Cumulative impacts of any action alternative as they relate to climate change would be the same as the No Action Alternative: **minor** to **moderate** and long term.			
Light	Future offshore wind activities would impact viewshed resources in the long term from navigational and aviation lighting on structures and in the short term from construction lighting. Impacts from lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of cultural resources would be affected and would include those for which the nighttime sky is a contributing element to historic integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Under the No Action Alternative, lighting from future offshore wind activities would have short-term to long-term **negligible** to **major** negative impacts on viewshed resources.	**Offshore**: Impacts from construction and installation lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of the 451 NRHP-eligible viewshed resources identified in the HRVEA would be affected and would include those for which the nighttime sky is a contributing element to aspects of its integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. Of the 451 NRHP-eligible viewshed resources identified in the HRVEA, 350 would experience **negligible** to **minor** visual impacts, not rising to the level of adverse effects under the criteria of NHPA Section 106; seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). Of the 451 NRHP-eligible viewshed resources, 101 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSSs that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). Of these 101 aboveground historic properties that would be negatively affected to a moderate to major extent that would rise to the level of adverse effect under the NHPA Section 106 criteria (36 CFR 800.5), five of these are NHLs, two are TCPs, and the remaining 91 are historic buildings, structures, and districts. Construction lighting and decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. ADLS use would substantially reduce the visual impact from Project lighting and make lighting visibility much more intermittent but would not eliminate the impact fully. Under the	**Offshore**: Compared to the maximum-case scenario under the Proposed Action, Alternatives C through F could decrease impacts to viewshed resources from construction and installation lighting for offshore wind structures because the number of constructed WTGs and their viewshed would be reduced. Lighting would be reduced from up to 100 WTGs under the Proposed Action to the following: • 64 or 65 WTGs (up to 35% to 36% less, respectively) under Alternative C. • 78 and 93 WTGs (up to 7% to 22% less) under Alternative D. These lighting impacts under Alternative D would remain greater than those of Alternative C. Alternative D3 would specifically remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on aboveground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs on the Block Island side of the RWF. • Between 64 and 81 WTGs (up to 36% to 19% less) under Alternative E. Alternative E1 configuration, in particular, would reduce the proximity of WTG lighting to Martha's Vineyard and toward mainland Rhode Island (see Figure 2.1-18). Alternative E2 would remove the closest WTGs to Martha's Vineyard and be most advantageous for reducing WTG proximity to Block Island; however, it would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. Although the distance of WTGs from Martha's Vineyard would increase under Alternative E specifically compared to other alternatives, the total number of lights and lighting impacts would remain greater than those of Alternative C and would reach the potential lower limit of light numbers and impacts of Alternative D. Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project lights to viewshed resources there, especially under Alternative E1 (see Figure 2.1-18). This especially includes increased setbacks from viewshed resources important to Native American tribes at Aquinnah, inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative E also further increases setbacks from Newport and			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		Proposed Action, lighting would have short-term to long-term **negligible** to **major** negative impacts on viewshed resources. Long-term **negligible** to **major** negative impacts would continue for viewshed resources during O&M. O&M would not add further to these impacts; however, removing WTGs and OSSs through decommissioning would provide a remedy to previous visual impacts created by lighting. The Proposed Action would add offshore lighting impacts from navigational and aviation hazard lighting systems on the WTGs and OSSs. The addition would include up to 100 WTGs with red aviation hazard flashing lights and up to 100 WTGs and two OSSs with marine navigation lighting, compared to the future offshore wind activities' potential of up to 955 WTGs and three OSS locations offshore of Rhode Island and Massachusetts (including RWF), as evaluated in a maximum-case scenario for the cumulative visibility analysis for the Project (EDR 2021c). Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities could have intermittent and short-term to long-term **negligible** to **major** negative impacts on viewshed resources.	Block Island (see Figure 2.1-19), including the Breakers, Marble House, and the Ocean Drive Historic District, Bellevue Avenue Historic District, and Southeast Lighthouse NHLs. The Alternative E setbacks for RWF WTGs would increase the distances to viewshed resources at Aquinnah by between approximately 0.25 and 1 mile, at Newport and mainland Rhode Island by approximately 4 miles, and at Block Island variably beginning at less than 1 mile and extending to over 4 miles. Therefore, Alternative E would be more effective in reducing visual impacts from the nearest potential WTGs to viewshed resources at Martha's Vineyard and along Rhode Island shores compared to other action alternatives but would not eliminate visual impacts to all viewshed resources and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C or F. • As few as 56 WTGs (up to 44% less than the maximum of 100 WTG under the Proposed Action) under Alternative F when combined with any of the action alternatives (C1, C2, or E1) intended to allow for the fulfillment of the existing three PPAs' generation requirement of at least 704 MW. These lighting impacts under Alternative F could potentially be reduced from those of the other action alternatives, where WTG numbers are comparatively less. Although reduced, the layout modification and construction activities proposed under Alternatives C through F would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Portions of all RWF WTGs would potentially be visible from approximately most of the 101 NRHP-eligible viewshed resources moderately to majorly impacted under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have the WTG visibility reduced somewhat due to intervening land areas and with setback distance from the coastline. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources. Under Alternatives C through F, the construction and installation of offshore Project components with lighting would have short-term to long-term **negligible** to **major** negative impacts to viewshed resources, similar to those of the Proposed Action. O&M and decommissioning of offshore Project components with lighting would have short-term to long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to those of the Proposed Action. Impacts from Project lighting would be removed upon completion of decommissioning. To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021c), Alternatives C through F would add offshore lighting impacts from navigational and aviation hazard lighting systems. The same 101 NRHP-eligible viewshed resources would continue to be negatively affected from a moderate to major degree by offshore lighting impacts in the viewshed APE under Alternatives C through F as the Proposed Action (per the criteria of adverse effects in 36 CFR 800). The cumulative offshore lighting impacts on viewshed resources in the viewshed APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative, until decommissioning of the Project. However, for Alternative E, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island.			
		Onshore: Based on a field review of the viewshed analyses, the OnSS and ICF construction areas would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a) within the viewshed APE. Short-	**Onshore**: Short-term **negligible** impacts from lighting of onshore Project activities or facilities resulting from construction and installation of Alternatives C through F are expected on viewshed resources, similar to the Proposed Action.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		term **negligible** negative impacts from lighting of onshore Project activities or facilities during construction and installation are expected on viewshed resources. The impacts from light resulting from O&M activities associated with the Proposed Action would be the same as those described for Project installation and construction: **negligible** but long-term. Long-term **negligible** impacts from lighting of onshore Project activities or facilities are expected on cultural resources in the viewshed APE, and these would not add cumulatively to the potential lighting impacts of other reasonably foreseeable activities.	Impacts from lighting of onshore Project components during O&M and decommissioning would be the same for Project installation and construction under Alternatives C through F as for the Proposed Action. Long-term **negligible** impacts to cultural resources from lighting of onshore Project activities or facilities would be expected in the viewshed APE. The same as the Proposed Action, light would result in no cumulative impacts to viewshed resources from Alternatives C through F.			
Presence of structures	Within the viewshed APE, if BOEM selects the No Action Alternative, the development of future offshore wind projects' onshore infrastructure (the presence of structures) could introduce new visible elements to the setting of viewshed resources that would diminish their historic integrity, where there is an unimpeded line of sight from the viewshed resource to the onshore infrastructure. Within the offshore viewshed APE, the maximum-case scenario of 955 WTGs from all other future offshore wind activities would have a greater visual impact on most aboveground historic properties within the viewshed APE upon full build-out than would the RWF alone with its up to 100 WTGs. Under the No Action Alternative, the construction, installation, and O&M of future offshore wind activities could locate WTGs in the viewshed APE. Beginning at approximately 11 miles from NRHP-eligible viewshed resources at Nomans Land Island and extending to over 30 miles at NRHP-eligible viewshed resources at Long Island, New York, and mainland Connecticut, impacts from future offshore wind projects would result in long-term **negligible** to **major** negative visual impacts to NRHP-eligible viewshed resources in the viewshed APE, including NHLs.	**Offshore**: The construction of the offshore Project components would result in modifications to the existing setting of aboveground historic properties within the viewshed APE because a range of RWF WTG structures would be visible on the horizon from various viewshed resources on the shore during the daytime and structure lighting would be visible at night as addressed in the light impact discussion (EDR 2022; see also Section 3.20 for further discussion). Visibility of WTG structures would have long term, intermittent, and localized impacts, where and when not adequately obscured or diffused. Of the 451 NRHP-eligible viewshed resources within the viewshed APE, 350 would have noncritical and/or limited views of WTGs. These 350 NRHP-eligible viewshed resources would experience **negligible** to **minor** visual impacts. The remaining 101 NRHP-eligible viewshed resources of the 451 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSS. These 101 resources include five NHLs and two TCPs. Under the Proposed Action, the presence of offshore Project wind facilities would have long-term **negligible** to **major** negative impacts on viewshed resources for Project installation and construction through the life of the Project until decommissioning is complete. The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the condition of the No Action Alternative within the viewshed APE. Visual impacts to viewshed resources from the Project would be long term and **negligible** to **major** negative, minimized with distance and obstructions. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative cumulative negative impacts on NRHP-eligible viewshed resources, represented by aboveground historic properties, in the viewshed APE.	**Offshore**: Alternatives C through F could decrease impacts to viewshed resources when compared to the Proposed Action because the number of constructed WTGs and their viewshed would be reduced by up to 35% to 36% for Alternative C, 7% to 22% for Alternative D, 19% to 36% for Alternative E, and as much as 44% for Alternative F (when combined with Alternative C1, C2, or E1), as compared to the maximum-case scenario under the Proposed Action. Comparative analysis of Alternatives C through F and proportionality of visual impacts from the daytime visibility of offshore WTGs and OSSs on viewshed resources is the same as for nighttime lighting of these Project structures. Although reduced, the layout modification and construction activities proposed under these alternatives would still include the same viewshed resources visually impacted under the Proposed Action and the same potential for impacts to these resources. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to those of the Proposed Action. The O&M and decommissioning of offshore Project components would have long-term **negligible** to **major** negative impacts to viewshed resources under Alternatives C through F, similar to but reduced from those of the Proposed Action. Impacts from the presence of structures offshore would be removed once decommissioning is complete. While the visual impacts from offshore Project structures described for construction and installation (see Section 3.10.2.4.1) would persist through O&M and decommissioning activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs, impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE. To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021c), Alternatives C through F would add fewer WTGs than the Proposed Action. The same 101 NRHP-eligible viewshed resources continue to be negatively affected from a moderate to major degree by offshore presence of structures in the viewshed APE as the Proposed Action (per the criteria of adverse effects in 36 CFR Part 800). The cumulative visual impacts on viewshed resources in the viewshed APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term **negligible** to **major** negative, until decommissioning of the Project. However, for Alternative E, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island.			
		Onshore: For the onshore viewshed APE, construction and installation of the onshore Project facilities could introduce new visible elements to the setting of NRHP-eligible viewshed resources that would diminish	**Onshore**: For the onshore viewshed APE, construction and installation of the onshore Project facilities under Alternatives C through F would be the same as those under the Proposed Action.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		their historic integrity, where there is an unimpeded line of sight between the resource and the onshore Project facilities. Although the NRHP-eligible Quonset Point Naval Air Station and Wickford Historic District are within the viewshed APE of the OnSS and ICF, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District. As a result of the construction and installation, O&M, and decommissioning of the onshore Project facilities, the potential visual impacts to the NRHP-eligible Quonset Point Naval Air Station and the Wickford Historic District would be long term **negligible** to **minor.** The Proposed Action's onshore facilities would not add cumulative impacts from the presence of structures resulting from other reasonably foreseeable activities.	Therefore, impacts to viewshed resources within the viewshed APE would be short to long term **negligible** to **minor** (the same as the Proposed Action). Impacts from the presence of structures resulting from O&M and decommissioning activities associated with onshore Project components would be the same for Project installation and construction under Alternatives C through F as for the Proposed Action. As a result of the O&M and decommissioning of the onshore Project facilities, the potential visual impacts to viewshed resources are anticipated to be **negligible** to **minor** for the long term. The same as the Proposed Action, the presence of onshore structures would result in no cumulative impacts from Alternatives C through F or the Proposed Action to viewshed resources.			

3.10.2.2 Alternative B: Impacts of the Proposed Action on Marine Cultural Resources

3.10.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. The risk would be increased primarily during construction but also would be present during O&M and decommissioning. All vessels would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize impacts resulting from the release of debris, fuel, hazardous material, or waste on marine cultural resources (BOEM 2012). Additionally, required training and awareness of BMPs proposed for waste management and mitigation of marine debris for RWF Project personnel would reduce the likelihood of occurrence to a very low risk. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects accidental releases and discharges would have localized short-term **negligible** negative impacts on marine cultural resources.

Anchoring: Vessel anchoring would be associated with seafloor disturbance activities (short and long term) proposed for the Project consisting of clearing/leveling of the seafloor, monopile foundation (and associated cable protection) construction, export cable installation, and OSS-link cable and IAC installation (preparation, trenching, burial, maintenance, replacement, etc.). Anchoring disturbance would affect up to 3,178 acres of the seafloor under the maximum case scenario (see Table E4-1). Revolution Wind has committed to siting the RWF and RWEC to avoid or minimize impacts to potential submerged archaeological sites and ancient submerged landforms to the extent practicable (vhb 2022). A plan for construction-related vessels would be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources. Additionally, a post-review discovery plan (in Appendix J) would be implemented that would include stop-work and notification procedures to be followed if a potentially significant cultural resource is encountered during construction. The impacts to many of the identified potential submerged historic-period cultural resources and some of the potential ancient submerged landforms may be avoided or minimized through redesign. However, some of the potential ancient submerged landforms are large and extend substantially beyond the area investigated and avoidance may not be practicable. Revolution Wind recommended 50-m (164-foot) avoidance buffers on the 19 targets identified as possible shipwreck archaeological sites. The impacts to marine cultural resources would be irreversible and **major** negative unless all NRHP-eligible marine cultural resources and marine cultural resources significant to Native American tribes can be avoided during anchoring.

Climate change: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Cable emplacement for the Proposed Action could physically impact marine cultural resources. Installation of the IAC, OSS-link cable, and RWEC would impact the

seafloor within the Lease Area and along the cable route. These impacts result from preparation of the seafloor for installation of new cables by sandwave leveling and clearance of debris, boulders, and other objects as well as from the cable lay and burial. This could include removal of potential MEC/UXOs in advance of seabed preparation for RWEC installation. The construction and installation footprint for the RWEC would impact 1,390 acres of the seafloor (see Table E4-1). The operational footprint for the RWEC is calculated at 8,349 acres, and the cable would be emplaced to depths of up to 13 feet below the seafloor (see Table 2.1-3). The IAC and OSS-link cable would be emplaced at depths of up to 10 feet below the seafloor and require up to 2,619 acres of horizontal seafloor disturbance. Revolution Wind recommended a 50-m (164-foot) avoidance buffer on the 19 targets identified as shipwreck archaeological sites. Three of the 19 shipwreck archaeological sites (Targets 11, 13, and 14) and five of the 10 ancient submerged landforms (Targets 21, 22, 23, 29, and 30) are located along the RWEC. Seven of the shipwreck archaeological sites (Targets 06, 07, 08, 09, 10, 16, and 19) and three ancient submerged landforms (Targets 26, 27, and 28) are located in planned IAC corridors within the RWF. Where Revolution Wind would avoid the shipwreck sites by a distance of 50 m (164 feet), the Project would have no impact on them. Although a large portion of each of the three ancient submerged landforms is located below the maximum vertical extent for the installation of the IACs, portions of all three may be impacted. As discussed in Anchoring above, impacts to some of the shipwreck archaeological sites and ancient submerged landforms may be avoided by adjustments to cable route and by using a DP vessel instead of an anchored vessel for the cable lay. If these shipwreck and ancient submerged landforms are determined eligible for the NRHP and they cannot be avoided by new cable emplacement, then the impacts would be irreversible and **major** negative.

Presence of structures: Placement of the WTGs and OSSs would impact the seafloor within the Lease Area. Revolution Wind selected monopile foundations as the WTG for the Proposed Action (vhb 2022). The limits of the Proposed Action were defined as the 200-m (656-foot) radius temporary workspace limit surrounding each WTG. The Project anticipates impacting up to 734.4 acres of seafloor for construction of the up to 100 WTG and up to two OSS locations (see Table E4-1). Revolution Wind recommended a 50-m (164-foot) avoidance buffer on targets identified as shipwreck archaeological sites. One shipwreck archaeological site (Target 05) and two ancient submerged landforms (Targets 25 and 28) are located within 200 m of a WTG foundation location. Two of ancient submerged landforms (Targets 27 and 28) would be avoidable through Project micrositing (SEARCH 2022). For shipwreck and ancient submerged landforms determined NRHP eligible and that can be avoided by the placement of WTGs and OSSs, the impacts would be long term **negligible** negative. If these shipwreck and ancient submerged landforms are determined NRHP eligible, and they cannot be avoided by construction of structures, then the impacts would be long term **major** negative.

3.10.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: Accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions could occur during O&M and decommissioning. The contribution of releases during these activities would be the same as during construction (refer to section 3.10.2.2.1), and for this reason, BOEM expects localized and temporary **negligible** negative impacts on marine cultural resources from accidental releases and discharges.

Anchoring: Revolution Wind would be expected under any BOEM approval of the COP to conduct O&M activities on equipment in areas that have been surveyed and found to contain no marine cultural resources and/or in areas that have previously experienced disturbance during construction. Because of this, during O&M, Revolution Wind would avoid the no-anchorage areas identified to avoid documented sensitive resources. Therefore, impacts of anchoring or use of a jack-up barge on identified marine cultural resources, including shipwrecks and ancient submerged landforms, would be **negligible** during O&M activities. Decommissioning activities would be expected to take place in previously disturbed areas and therefore impacts to confirmed submerged cultural resources and identified ancient submerged landform features from anchoring would be **negligible** over the long term.

Climate change: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Although no new cables would be emplaced during O&M or decommissioning, Revolution Wind anticipates that it may be necessary to uncover or rebury portions of the IAC, OSS-link cable, and RWEC over the life of the Project. It is expected that most, if not all, of the bottom disturbance would be located within previously disturbed areas or surveyed areas outside identified marine cultural resources. However, should it be necessary for maintenance activities to extend outside previously disturbed areas, avoidance or mitigation measures implemented for construction would be employed (vhb 2022). As a result, O&M and decommissioning activities related to cables are expected to result in long-term **negligible** to **minor** negative impacts to marine cultural resources.

Presence of structures: It is expected that O&M and decommissioning activities at WTG and OSS structures would be located within previously disturbed areas or surveyed areas outside of identified marine cultural resources. As a result, O&M and decommissioning activities related to WTGs and OSSs are expected to result in long-term **negligible** to **minor** negative impacts to marine cultural resources.

3.10.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The risk would be increased primarily during construction but also would be present during O&M and decommissioning. Refer to Section 3.10.2.2.1 for a discussion of the risk for spills and the measures put in place to avoid, minimize, and mitigate them. These accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and short-term **negligible** negative impacts from accidental releases and discharges on marine cultural resources. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable activities would be expected to have short-term **negligible** to **minor** negative cumulative impacts to marine cultural resources.

Anchoring: Seafloor disturbance from anchoring would occur during construction of the RWF and RWEC. Revolution Wind has committed to siting the RWF and RWEC to avoid or minimize impacts to marine cultural resources to the extent practicable (vhb 2022) and to implementing an anchoring plan and a post-review discovery plan. As noted for the No Action Alternative, impacts from a combination of reasonably foreseeable offshore projects to submerged cultural resources, or the larger submerged landforms within which these submerged cultural resources are identified, would result in cumulative impacts to these resources. Within its EPMs, Revolution Wind would prioritize avoidance; however, avoidance may not be feasible for all marine cultural resources identified along the export cable corridor. Although anchoring from other future wind energy activities is not expected, anchoring from other reasonably foreseeable activities in the marine APE could impact marine cultural resources. Should these impacts be added to by unavoidable impacts of the Proposed Action on marine cultural resources along its export cable corridor, anchoring would result in irreversible and **negligible** to **major** negative cumulative impacts on marine cultural resources.

Climate change: Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on marine cultural resources in the marine APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of this Project since the ongoing effects of climate change on marine cultural resources would remain effectively permanent and therefore long term.

New cable emplacement/maintenance: Cable installation from the Proposed Action, future offshore wind activities, and other submarine cable activities could impact marine cultural resources. Installation of the IAC, OSS-link cable, and RWEC would impact the seafloor within the Lease Area and along the RWEC route. These impacts result from preparation of the seafloor for installation of new cables by sandwave leveling and clearance of debris, boulders, and other objects as well as from the cable lay and burial. The Project and other future offshore wind activities are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. Since shipwrecks are typically limited in extent, it is often possible to avoid impacting them during cable installation and maintenance. Ancient submerged landforms are generally larger and may extend substantially beyond the maximum work area or Lease Area for an undertaking; for this reason, it may not be practicable to avoid these features through Project redesign. Although Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area, it is likely that all construction disturbances associated with the Project would not be avoidable at NRHP-eligible marine cultural resources within the export cable route. Cable emplacement and maintenance from future offshore wind activities and other reasonably foreseeable activities are not expected in the marine APE at identified marine cultural resources and would not add cumulative impacts to the general impacts from Project cabling. Cumulative impacts from the Project in relation to other reasonably foreseeable offshore cabling activities would be **negligible** negative for the long term.

Presence of structures: WTG and OSS placement by the Proposed Action and future offshore wind activities could impact marine cultural resources as described in Section 3.10.2.2.1 above. The Project and other future offshore wind activities are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources during construction, O&M, and decommissioning. Revolution Wind has determined it could avoid impacts to marine cultural resources within the Lease Area. Other

future offshore wind energy activities would not place structures in the RWF Lease Area. Based on these factors, cumulative impacts from the Project in relation to other future offshore wind energy activities would be **negligible** negative for the long term.

3.10.2.2.4 Conclusions

Under the Proposed Action, the construction and installation of offshore components, as well as their O&M, would have long-term **major** negative impacts on marine cultural resources that are not avoidable by seafloor-disturbing activities from the Project. **Major** negative impacts would be limited to those unavoidable impacts that result in a substantial loss of qualifying characteristics of a marine cultural resource for NRHP inclusion. **Major** negative impacts from the Proposed Action would result from the physical disturbance or damage of all or part of an NRHP-eligible marine cultural resource. Although these impacts would be constrainable to the portions of ancient submerged landform features that Revolution Wind is unable to avoid during RWEC installation, the final magnitude of these impacts would be long term **minor** to **moderate** negative. Measures determined by BOEM and stipulated within the ROD to avoid, minimize, and/or mitigate negative effects on NRHP-eligible marine cultural resources would reduce the level of impact. The exception is where impacts would render the resource ineligible for the NRHP even with mitigation, in which case the impact on the marine cultural resource would remain **major**. Also, impacts to previously undiscovered marine cultural resources identified during implementation of the Proposed Action could be long term **minor** to **major** negative. However, BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a marine cultural resource is encountered during construction and installation, O&M, and decommissioning. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible marine cultural resources to long term **moderate** negative or lower (**minor** or **negligible**).

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from long term **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative impacts to marine cultural resources. BOEM made this determination because, while overall moderate to major negative effects to NRHP-eligible marine cultural resources would be mitigated in accordance with NHPA Section 106 regulations, irreversible and long-term impacts would remain.

3.10.2.3 Alternative B: Impacts of the Proposed Action on Terrestrial Cultural Resources

3.10.2.3.1 Construction and Installation

Onshore Activities and Facilities

Accidental releases and discharges: As discussed in the No Action Alternative (see Section 3.10.1.2), construction of onshore Project elements could result in the accidental release of hazardous materials or debris; however, releases would generally be short term, localized, and in limited amounts. Indirect physical impacts would be long term and **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Other indirect but primarily short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity related to accidental

releases and discharges. These short-term impacts would be **negligible** to **minor** negative and minimized or avoided through application of state and local laws and regulations.

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as relates to climate change and would be **negligible**. Refer to Section 3.10.1.2 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Proposed Action since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

Presence of structures: The construction of onshore Project components would physically disturb the two archaeological sites within the OnSS work area limits and the one archaeological site and one isolated archaeological artifact within the ICF work area limits (Forrest and Waller 2021). The Mill Creek Swamp #1 and Mill Creek Swamp #2 archaeological sites within the OnSS work area limits are eligible for the NRHP, and physical impacts to these resources would be **negligible** to **minor** in site portions that construction is able to avoid and **moderate** to **major** negative in site portions where construction is not able to avoid physical impacts. The Quonset Substation archaeological site and the QDC Find Spot artifact within the ICF work area limits are recommended not eligible for the NRHP, and any physical impact to them would result in **negligible** to **minor** negative impacts.

Overall, the potential is for permanent **negligible** to **major** negative impacts to result from the Project on terrestrial cultural resources. Where the NRHP-eligible Mill Creek Swamp #1 and Mill Creek Swamp #2 archaeological sites cannot be avoided by OnSS development, BOEM would require further archaeological mitigation at these resources, in compliance with NHPA Section 106. BOEM would require a post-review discovery plan to be in place and implemented by Revolution Wind prior to and during ground-disturbing activities at any of the four terrestrial cultural resources.

New cable emplacement/maintenance: The impacts from new cable emplacement and maintenance for the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE (see Section 3.10.1.2.1). The cable landing envelope use and the crossing of the historic Quonset Point Naval Air Station would produce **negligible** negative long-term impacts. The route selected for the onshore transmission cable is located within existing ROWs and would minimize impacts to, or avoid, potential terrestrial cultural resources, to the extent practicable. Additionally, the onshore transmission cable route has been substantially altered by development, demolition, remediation, and associated grading activities postdating 1941. Also, BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a terrestrial cultural resource is encountered during cable emplacement or maintenance. This plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible terrestrial cultural resources to long term **moderate** negative or lower (**minor** or **negligible**). Therefore, the risk of potentially encountering undisturbed archaeological deposits is minimized in these areas, and the resultant impact to terrestrial cultural resources would be long term **negligible** to **minor** negative.

3.10.2.3.2 Operations and Maintenance and Decommissioning

Onshore Activities and Facilities

Accidental releases and discharges: The impacts from accidental releases and discharges resulting from Project O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project construction and installation (see Section 3.10.2.3.1). As a result, indirect physical impacts would be long term **negligible** to **major** negative, depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required.

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be long-term **negligible**, and impacts from climate change are anticipated to remain long term **minor** to **moderate** negative.

Presence of structures: O&M and decommissioning activities would remain in areas of existing construction disturbance, areas mitigated for archaeology prior to construction, and areas of previous terrestrial cultural resources Phase 1 survey work found not to contain NRHP-eligible archaeology sites. Therefore, these activities would proceed outside of, and avoid, unmitigated areas of NRHP-eligible archaeological sites Mill Creek Swamp #1 and #2. Should unmitigated areas of Mill Creek Swamp #1 and #2 archaeological sites not be avoidable by O&M or decommissioning at the OnSS, then BOEM would require further archaeological mitigation at these resources, in compliance with NHPA Section 106. BOEM would require that the post-review discovery plan prepared for Project construction remain in place and implemented by Revolution Wind during ground-disturbing O&M or decommissioning to address any additional buried archaeological deposits unexpectedly encountered during these activities.

Physical impacts to these resources would be short to long term **negligible** negative when avoided by O&M and decommissioning activities and long term **minor** to **major** negative if ground-disturbing activities are not able to avoid these impacts.

New cable emplacement/maintenance: The impacts from new cable emplacement/maintenance resulting from O&M and decommissioning activities associated with the Proposed Action would not introduce greater impacts to terrestrial resources over the No Action Alternative in the terrestrial APE. Maintenance of the cable within the historic Quonset Point Naval Air Station would produce impacts that are long term and **negligible**. O&M and decommissioning activities for the onshore cable would be expected to remain in areas of existing construction disturbance or areas of previous terrestrial cultural resources Phase 1 survey work. Consequently, long-term **negligible** negative impacts would occur to terrestrial cultural resources during O&M and decommissioning activities.

3.10.2.3.3 Cumulative Impacts

Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action would contribute accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions present under the No Action Alternative. The Proposed Action would have development activities potentially occurring at the historic Quonset Point Naval Air Station. The risk of impact from accidental releases and discharges would be increased primarily during construction but also would be present during Project operations and

decommissioning. Compliance with federal, state, and local requirements for the prevention and control of accidental releases and discharges would minimize impacts on terrestrial cultural resources (BOEM 2012). Releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized short-term **negligible** negative cumulative impacts on terrestrial cultural resources within the terrestrial APE.

Climate change: Cumulative impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on terrestrial cultural resources in the terrestrial APE is unknown, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on terrestrial cultural resources would remain effectively permanent and therefore long term.

Presence of structures: No future offshore wind projects other than the Project are expected to have development activities and impacts on terrestrial cultural resources within the terrestrial APE. The impacts from the presence of structures under the Proposed Action could result in long-term **negligible** negative cumulative impacts within the terrestrial APE. The Proposed Action is anticipated to result in impacts to the Mill Creek Swamp #1 and #2 archaeological sites; no cumulative effects from the onshore components of reasonably foreseeable offshore wind activities are anticipated at these two terrestrial cultural resources.

New cable emplacement/maintenance: Within the Project's terrestrial APE, no future offshore wind projects other than the RWF are expected to have development activities and impacts on terrestrial archaeological resources. The impacts from new cable emplacement/maintenance under the Proposed Action could result in long-term **negligible** cumulative impacts at the historic Quonset Point Naval Air Station where combined with other non-offshore wind project development or ongoing use or maintenance at that site.

3.10.2.3.4 Conclusions

Under the Proposed Action, the construction and installation of onshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts on terrestrial cultural resources within the terrestrial APE. **Negligible** impacts would occur where NRHP-eligible terrestrial cultural resources could be avoided and would be short term. **Minor** impacts would occur and be short term (for the period of Project activity) where Project impacts might take place on an NRHP-eligible terrestrial cultural resource, such as the Quonset Point Naval Air Station, but not alter any qualifying characteristics that make the resource eligible for NRHP inclusion. **Moderate** to **major** negative long-term impacts would be limited to unavoidable impacts that would result in the loss of qualifying characteristics of a terrestrial cultural resource for NRHP inclusion. **Moderate** to **major** negative impacts from the Proposed Action would result from the physical disturbance or damage of all or part of a NRHP-eligible terrestrial cultural resource and be long term and irreversible. Also, impacts to previously undiscovered, NRHP-eligible terrestrial cultural resources identified during implementation of the Proposed Action could be irreversible and long-term **major** negative. However, BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a cultural resource is encountered during construction and installation, O&M, and decommissioning. This

plan would serve to reduce the level of impact to previously undiscovered, NRHP-eligible terrestrial cultural resources to **moderate** negative or lower levels of impact; however, impacts would remain long term and irreversible.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **major** negative impacts to terrestrial cultural resources within the terrestrial APE. BOEM made this determination because, while overall moderate to major negative effects to NRHP-eligible terrestrial cultural resources would be mitigated in accordance with NHPA Section 106 regulations, irreversible and long-term impacts would remain. In comparison, the No Action Alternative is expected to result in long-term **negligible** to **major** negative effects to terrestrial cultural resources in the terrestrial APE, depending on whether cultural resources can be avoided.

3.10.2.4 Alternative B: Impacts of the Proposed Action on Viewshed Resources

3.10.2.4.1 Construction and Installation

Offshore Activities and Facilities

Climate change: The impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.3 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The Project would impact viewshed resources from navigational and aviation lighting on offshore wind Project components. Impacts from construction and installation lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of the 451 NRHP-eligible viewshed resources identified in the HRVEA would be affected and would include those for which the nighttime sky is a contributing element to aspects of its integrity, such as resources on the nearest shores of Rhode Island and Massachusetts and their offshore islands. The majority of the 451 resources with potential views of the Project, and therefore determined to be in the viewshed APE, are along the coastlines with potential ocean views. Of the 451 NRHP-eligible viewshed resources, 350 would experience **negligible** to **minor** visual impacts, not rising to the level of adverse effects under the criteria of NHPA Section 106 regulations (36 CFR 800.5); seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). Of the 451 NRHP-eligible viewshed resources, 101 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSSs that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). Of the 101 aboveground historic properties that would be negatively affected to a moderate to major extent, five are NHLs, two are TCPs, and the remainder are historic buildings, structures, and districts.

In relation to the negatively affected viewshed resources, the Project could locate WTGs at approximately 6 miles from the Vineyard Sound and Moshup's Bridge TCP boundary offshore of Nomans Land Island and range to just over 28 miles from the Nobska Point Lighthouse near Falmouth, Massachusetts. Mostly, only the closer of the 101 moderately to majorly affected viewshed resources would have views of marine navigation lighting (consisting of flashing yellow lights) on WTGs or the OSSs. Increasing distances between viewshed resources and the nearest offshore RWF lighting sources would limit the intensity and begin eliminating negative lighting impacts at these 101 viewshed resources from red aviation warning lights atop WTG nacelles at distances beyond approximately 27 miles, based on postconstruction studies of the nearby Block Island Wind Farm's visibility at night (HDR 2019). See Section 3.10.1.3.1 for a discussion of how the intensity of lighting impacts would be reduced by proximity of existing light sources and atmospheric and environmental conditions. ADLS use would substantially reduce the visual impact from Project lighting and make lighting visibility much more intermittent but would not eliminate the impact fully. Under the Proposed Action, lighting would have short-term to long-term **negligible** to **major** negative impacts on viewshed resources.

Presence of structures: The construction of the offshore Project components would result in modifications to the existing viewshed within the viewshed APE because a range of RWF WTG structures would be visible on the horizon from various viewshed resources on the shore during the daytime and structure lighting would be visible at night, as addressed in the Light impact discussion above (EDR 2022; see also Section 3.20 for further discussion). Visibility of WTG structures would have long term, intermittent, and localized impacts, where and when not adequately obscured or diffused. Of the 451 NRHP-eligible viewshed resources identified by the HRVEA within the viewshed APE, 350 would have noncritical and/or limited views of WTGs. For a portion of the 350 resources, this is because the view to/from the resource's setting is not a critical aspect supporting the integrity of the viewshed resource for NRHP eligibility (EDR 2021b). For some of the other 350 resources, views are substantially limited because of screening by topography, vegetation, other buildings/structures, and environmental conditions (clouds, fog, and waves) compounded by distance to the offshore Project structures (EDR 2021b). These 350 NRHP-eligible viewshed resources would experience **negligible** to **minor** visual impacts not rising to the level of adverse effects under the criteria of NHPA Section 106; seven of these are NHLs that would not experience harm in consideration of NHPA Section 110(f). The remaining 101 NRHP-eligible viewshed resources of the 451 are anticipated to experience **moderate** to **major** visual impacts (daytime or nighttime) from the WTGs or OSS that would rise to the level of adverse effect under NHPA Section 106 (see Table 3.10-6). These 101 resources do have open ocean views that contribute to their significance, integrity, and NRHP eligibility. These 101 resources include five NHLs and two TCPs. The 101 resources also include historic districts that may encompass a range of contributing elements. As noted in the Lighting impacts discussion, the Project could locate WTGs approximately 6 miles from the nearest moderately to majorly affected NRHP-eligible viewshed resource at the Vineyard Sound and Moshup's Bridge TCP boundary offshore of Nomans Land Island. Moderate to major visual impacts from the Project would range to just over 28 miles at the negatively affected Nobska Point Lighthouse near Falmouth, Massachusetts. The distances between the areas with viewshed resources and the nearest RWF lighting sources would limit the intensity but not eliminate negative WTG visibility impacts to NRHP-eligible viewshed resources. Further moderating the visual impacts, the RWF WTGs would have consistent structural appearances (monopoles, three-rotor blades, and matching color schema), which contribute to a homogeneous view of wind farms on the horizon. The color of the RWF WTGs (less than 5% gray tone) would blend well with the sky at the horizon and eliminate the need for daytime lights or

red paint marking the blade tips. For NRHP-eligible viewshed resources with ocean views important to their setting, the WTGs would be a new feature in the visual setting. Views in which strongly frontlit WTGs are viewed against a darker sky or strongly backlit WTGs were viewed against a light sky tend to heighten the visual impact, meaning the intensity of the effect may vary by time of day and year. Under the Proposed Action, the presence of offshore Project wind facilities would have long-term **negligible** to **major** negative impacts on viewshed resources.

Onshore Activities and Facilities

Light: Based on a field review of the viewshed analyses, the OnSS and ICF construction areas would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a) within the viewshed APE; see further discussion under the Presence of structures section immediately below. For nighttime construction work, RWF would use portable, downward-facing floodlights with a maximum height of approximately 18 feet. The OnSS and ICF would largely blend with the existing Quonset Point Naval Air Station, would be partially obscured by other intervening residential development and vegetation, and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District (EDR 2021a). Short-term **negligible** negative impacts from lighting of onshore Project activities or facilities during construction and installation are expected on viewshed resources.

Presence of structures. For the onshore viewshed APE, construction and installation of the onshore Project facilities could introduce new visible elements to the setting of NRHP-eligible viewshed resources that would compromise their historic integrity, where there is an unimpeded line of sight between the resource and the onshore Project facilities. At the OnSS and ICF, Revolution Wind would use external yard lighting and task lighting, consisting of switched lights (in use if someone is in the yards), ranging from 35- to 300-watt lamps, depending on use. The mounting heights for the lighting would range from 10 to 25 feet off the ground, and lights would be mounted on lamp posts, substation buildings, firewalls, or steel substation structures. The OnSS and ICF would be readily visible from two NRHP-eligible viewshed resources (EDR 2021a). From the OnSS and ICF location, the Wickford Historic District is 1.1 miles away and the Quonset Point Naval Air Station is 0.25 mile away.

The Quonset Point Naval Air Station is an approximately 974-acre World War II–era naval training facility improved with industrial buildings and parking lots that currently serves as a Rhode Island Air National Guard Base (EDR 2021a). The OnSS and ICF would be in scale and character with the existing development and use of the Quonset Point Naval Air Station. As a result of the construction and installation of the onshore Project facilities, the potential visual impacts to the NRHP-eligible Quonset Point Naval Air Station would be long term **negligible** to **minor** negative.

The Wickford Historic District retains eighteenth-century residences and its setting as a small-scale maritime community in Rhode Island. The Wickford Historic District remains primarily a residential community with some commercial buildings that support a seasonal recreation economy (EDR 2021a). The viewshed APE mostly reaches the area within the district along the Main Street pier. The OnSS and ICF would largely blend with the existing Quonset Point Naval Air Station; would be partially obscured by other intervening residential development and vegetation; and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District (EDR 2021a). As a result of the development of the onshore Project facilities, the potential visual impacts to the Wickford Historic District would be long term **negligible** to **minor** negative.

3.10.2.4.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Climate change: The impacts of the Proposed Action would be the same as the No Action Alternative as it relates to climate change and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The visual impacts from WTG and OSS lighting described in construction and installation in Section 3.10.2.4.1 would persist through O&M activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs. Impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE. However, for offshore WTGs, Revolution Wind would install ADLS technology. Consequently, nighttime visual impacts (and to a lesser degree, daytime visual impacts) to the 101 moderately to majorly affected viewshed resources would be reduced although not eliminated. Long-term **negligible** to **major** negative impacts would continue for viewshed resources during O&M. O&M would not add further to these impacts; however, removing WTGs and OSSs through decommissioning would provide a remedy to previous visual impacts created by lighting.

Presence of structures: This would be the same as for Project installation and construction through the life of the Project until decommissioning is complete. The visual impacts from offshore Project structures described for construction and installation in Section 3.10.2.4.1 would persist through O&M activities at 101 NRHP-eligible viewshed resources, including five NHLs and two TCPs, until the Project is decommissioned. Impacts would remain **negligible** to **minor** at the remaining 350 NRHP-eligible viewshed resources in the viewshed APE. **Negligible** to **major** negative impacts would continue for the long term at viewshed resources during O&M. O&M would not add further to these impacts; however, by removing WTGs and the OSS, decommissioning would provide a remedy to previous visual impacts created by visible offshore Project structures.

Onshore Activities and Facilities

Light: The impacts from light resulting from O&M activities associated with the Proposed Action would be the same as those described for Project installation and construction (see Section 3.10.2.4.1). Long-term **negligible** negative impacts from lighting of onshore Project activities or facilities are expected on viewshed resources from onshore activities and facilities.

Presence of structures: The impacts from the presence of structures resulting from O&M and decommissioning activities associated with the Proposed Action would be the same as those described for Project installation and construction (see Section 3.10.2.4.1). Although the NRHP-eligible Quonset Point Naval Air Station and Wickford Historic District are within the viewshed APE of the OnSS and ICF, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with the existing setting of the Wickford Historic District. As a result of O&M and decommissioning of the onshore

Project facilities, the potential visual impacts to the Quonset Point Naval Air Station and Wickford Historic District are anticipated to be long term **negligible** to **minor** negative.

3.10.2.4.3 Cumulative Impacts

Offshore Activities and Facilities

Climate change: Cumulative impacts of the Proposed Action as they relate to climate change would be the same as the No Action Alternative and would be **negligible**. Refer to Section 3.10.1.1 for the No Action Alternative discussion. Although the degree to which future offshore wind activities would reduce the impacts of climate change on viewshed resources in the viewshed APE is unknown, cumulative impacts from climate change are anticipated to remain **minor** to **moderate** negative even with the benefits of the Project since the ongoing effects of climate change on viewshed resources would remain effectively permanent and therefore long term.

Light: The Proposed Action would add offshore lighting impacts from navigational and aviation hazard lighting systems on the WTGs and OSSs. The addition would include up to 100 WTGs with red aviation hazard flashing lights and up to 100 WTGs and two OSSs with marine navigation lighting from RWF, compared to the future offshore wind activities' modeled maximum-case scenario of up to 955 WTGs and three OSS locations offshore of Rhode Island and Massachusetts (EDR 2021c). The 100 potential Project WTGs and two OSS locations represent, proportionally, nearly 10% to nearly 90% of the total cumulative offshore wind structures modeled as potentially visible from the 101 NRHP-eligible viewshed resources within the viewshed APE. The impacts of the Project and other future wind developments will vary and be relative to the position of each unique resource (SWCA 2022). Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities could have intermittent and short-term to long-term **negligible** to **major** negative impacts on viewshed resources.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the condition of the No Action Alternative within the viewshed APE, reaching a cumulative total of 1,055 WTGs and five OSS for the maximum-case scenario analysis. The Project has the potential to add to cumulative visual effects on the 101 NRHP-eligible viewshed resources identified as negatively affected from a moderate to major degree by the Project, when combined with the potential effects of other past, present, or reasonably foreseeable future actions (SWCA 2022). The Project would introduce new elements to the viewshed that could compromise the historic integrity of NRHP-eligible viewshed resources. The maximum-case Project scenario would proportionally range from nearly 10% to nearly 90% of the total WTG and OSS locations modeled to be cumulatively visible from the 101 NRHP-eligible viewshed resources in the maximum-case scenario of all future wind energy development proposed in the viewshed APE. This is based on full buildout of the Project (to up to 100 WTGs and two OSSs) and all other reasonably foreseeable offshore wind projects currently planned in the APE (modeled at 955 WTGs and three OSS [EDR 2021b]). The proportion of visible WTG elements added by the Project ranges from nearly 10% at Vineyard Sound and Moshup's Bridge TCP (where all modeled WTGs and OSS would potentially be visible) to nearly 90% at the historic U.S. Weather Bureau Station at Block Island (where the Project WTGs would be visible in greater numbers than the combination of all other future wind farms planned in adjacent OCS lease areas [41 Project WTGs would be visible there versus six WTGs from other planned projects]) (SWCA 2022). Visual impacts to sensitive receptors from the Project would be long term and **negligible** to **major** negative, minimized with distance and obstructions.

The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **major** negative cumulative impacts on NRHP-eligible viewshed resources in the viewshed APE.

Onshore Activities and Facilities

Light: Long-term **negligible** negative impacts from lighting of onshore Project activities or facilities are expected on cultural resources in the viewshed APE, and these would not add cumulatively to the potential lighting impacts of other reasonably foreseeable activities.

Presence of structures: The Proposed Action's onshore facilities would not add cumulative impacts from the presence of structures resulting from other reasonably foreseeable activities.

3.10.2.4.4 Conclusions

Under the Proposed Action, the construction and installation of offshore Project components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts on viewshed resources. Long-term **negligible** to **minor** impacts would occur where visual impacts to NRHP-eligible viewshed resources could either be avoided or could be minimized to the extent that no adverse effect results under the NHPA Section 106 criteria (at 36 CFR 800.5). Long-term **moderate** to **major** negative impacts would be limited to unavoidable impacts to NRHP-eligible viewshed resources in the viewshed APE. These impacts would remain until removed with Project decommissioning.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts to viewshed resources under the Proposed Action resulting from individual IPFs would range from long term **negligible** to **major** negative. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **major** negative impacts to viewshed resources. Overall negative effects to NRHP-eligible viewshed resources in the viewshed APE would be avoided or minimized and mitigated in accordance with NHPA Section 106 regulations and, although long term, viewshed impacts would be removed upon Project decommissioning.

3.10.2.5 Alternatives C, D, E, and F: Marine Cultural Resources

3.10.2.5.1 Conclusions

Alternatives C through F would reduce the number of WTGs and, in relation, increase the distance of WTGs and their associated cabling from some of the 29 marine cultural resources identified. This decrease in WTGs would have an associated reduction in seafloor disturbance in the marine APE. This would increase the ability of the RWF to avoid Project impacts to seven marine cultural resources under Alternative C, one shipwreck site under Alternative D, and between two and seven marine cultural resources under Alternative E, as compared to the Proposed Action. Impacts to marine cultural resources resulting from the Alternative F would be somewhat less than the Proposed Action and, potentially, the other action alternatives, but this cannot be quantified until the additional WTGs to be removed are identified. However, because the potential for impacts to the remaining marine cultural resources remains the same, the avoidance of impacts to all marine cultural resources in the Lease Area would be similarly sought under the Proposed Action as under Alternatives C through F. Also, because all action alternatives have the same export cable development proposed, impacts to marine cultural resources would remain the

same at the RWEC corridor. The construction and installation of offshore components, as well as their O&M and decommissioning, would have long term **negligible** to **major** negative impacts to marine cultural resources under all of these action alternatives.

In the context of other reasonably foreseeable environmental trends and planned actions and for the same reasons, BOEM also expects that Alternatives C through F's cumulative impacts to marine cultural resources would be similar to the Proposed Action: long term **negligible** to **major** negative.

3.10.2.6 Alternatives C, D, E, and F: Terrestrial Cultural Resources

3.10.2.6.1 Conclusions

Alternatives C through F would have the same Project activities and impacts in the terrestrial APE as the Proposed Action. BOEM expects that the impacts to terrestrial cultural resources resulting from Alternatives C through F would be the same as the Proposed Action. The construction and installation of onshore components, as well as their O&M and decommissioning, would have long-term **negligible** to **major** negative impacts to terrestrial cultural resources under any of the action alternatives.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's cumulative impacts to terrestrial cultural resources would be the same as the Proposed Action: long term **minor** to **major** negative.

3.10.2.7 Alternatives C, D, E, and F: Viewshed Resources

3.10.2.7.1 Conclusions

Alternatives C through F could reduce the number of WTGs installed compared to the maximum-case scenario under the Proposed Action by 7% to 44% (depending on the action alternative combined with Alternative F), which would have proportional reductions in visual impacts. BOEM expects that the overall impacts to cultural resources in the viewshed APE resulting from Alternatives C through F would be similar in the number of viewshed resources impacted and the character of impacts to the Proposed Action; although, for Alternative E, the visual proximity for impacts from offshore Project elements would specifically have increased setbacks from viewshed resources at Martha's Vineyard and the nearest shores of Rhode Island. Alternative D3 would also remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on aboveground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs on the Block Island side of the RWF. While Alternative E2 would remove the closest WTGs to Martha's Vineyard, as well as being the most advantageous for reducing WTG proximity to Block Island, this alternative would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. The Alternative E1 configuration, in particular, would increase the overall distance of WTGs from Martha's Vineyard and toward mainland Rhode Island (see Figure 2.1-18); whereas, Alternative E2 (see Figure 2.1-19) would especially serve to decrease the frequency of silhouetted turbines visible from Aquinnah Overlook at sunset. Impacts to cultural resources in the viewshed APE resulting from Alternative F would be less than the Proposed Action and potentially the other action alternatives, but that cannot be quantified until the WTGs to be removed are identified. The construction and installation of offshore and onshore Project components, as well as their O&M and decommissioning, would have short- to long-term **negligible** to **major** negative impacts to viewshed resources under any of the action alternatives. Decommissioning would remove these visual impacts. Overall, those action

alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential visual impacts on viewshed resources.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's cumulative impacts to viewshed resources would be similar to the Proposed Action: long term **negligible** to **major** negative. Decommissioning would remove the cumulative visual impacts of the Project. As with Project-specific visual impacts on viewshed resources, those action alternatives with the fewest WTGs and the greatest distances of setback would have the least degree of potential cumulative impacts on viewshed resources.

3.10.2.8 Mitigation

Mitigation measures for cultural resources are addressed in Appendix F, Table F-2, and are drafted in the memorandum of agreement (MOA), and its historic property treatment plans attached in Appendix J. Revolution Wind–committed measures identified in COP Appendix BB (Cultural Resources Avoidance, Minimization, and Mitigation Measures) would also be incorporated by BOEM into COP approval.

The MOA and its requirements would be set by BOEM under NHPA Section 106 as a condition of BOEM's signing the ROD. Under the MOA, adverse effects from the Project to NRHP-eligible cultural resources, including NHLs and TCPs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f).

3.11 Demographics, Employment, and Economics

3.11.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Demographics, Employment, and Economics

Geographic analysis area: The GAA for demographics, employment, and economics includes all of the ports listed in the COP as being potentially used during construction or operations as shown in Figure 3.11-1. The figure also includes the top 11 commercial fisheries ports as described in Section 3.9 (all of which generated an average of over $5,000 per year in revenues from the Lease Area and the area affected by the Revolution Wind Export Cable).

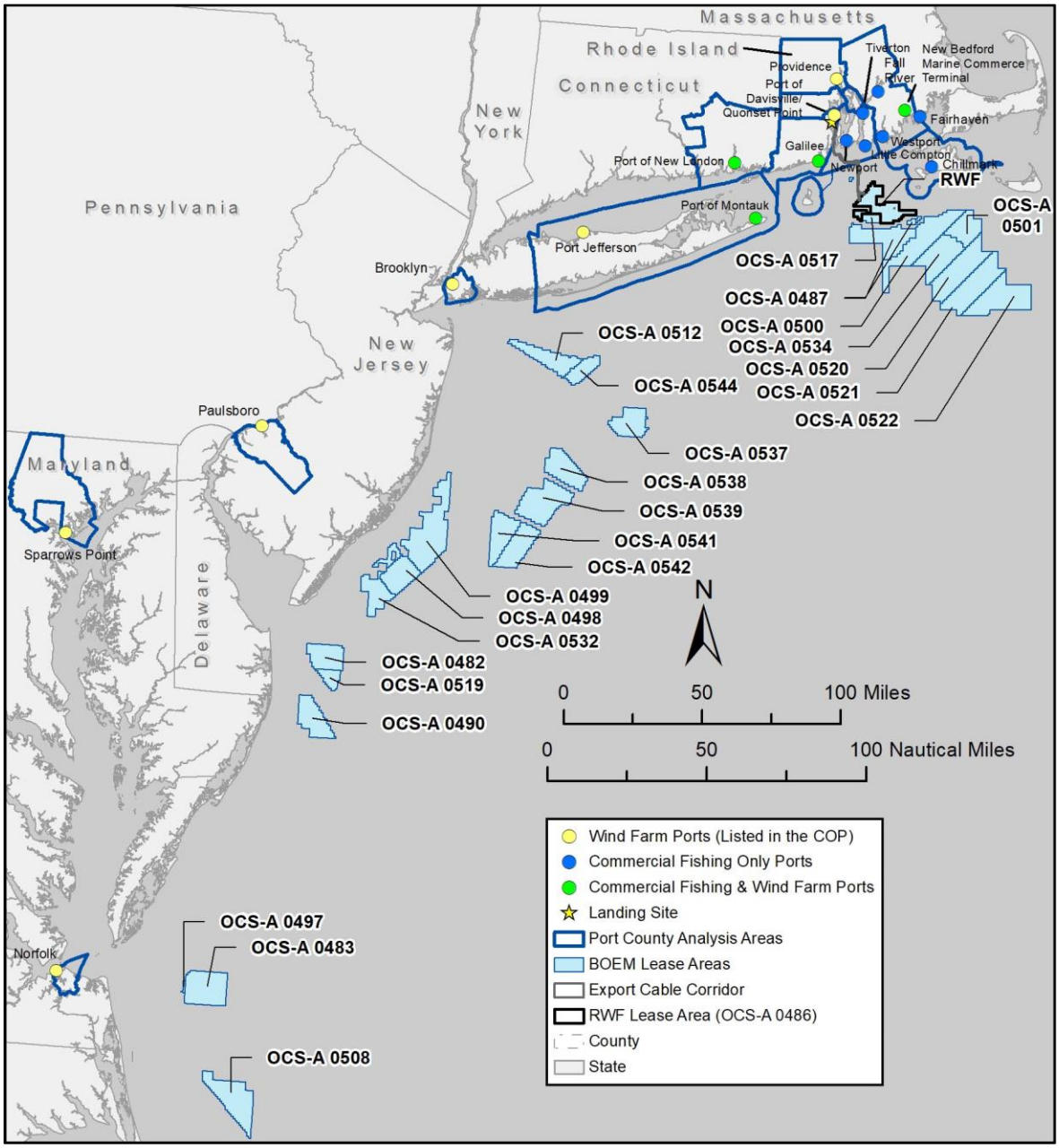


Figure 3.11-1. Geographic analysis area for demographics, employment, and economics.

Table 3.11-1 shows the ports listed in the COP as being potentially used to support construction or operations of the Proposed Action, and the wind farm–related activities that could occur each port. Section 3.3.10 of the COP indicates that Revolution Wind has not made a final decision regarding the specific ports that would be used to support offshore construction, assembly and fabrication, crew transfers, and logistics. Section 3.5.6 of the COP notes that the Project is evaluating the use of the Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, and Port of Montauk to support O&M of the Project and other offshore wind energy projects. Table 3.11-1 also includes the top 11 commercial fishing ports that received landings harvested from within the Lease Area as described in Section 3.9.

Table 3.11-1. Ports, Cities/Towns, Counties, and States in the Geographic Analysis Area

Port/ Facility Name/ Place Name	City/Town	County, State	WTG Tower, Nacelle and Blade Storage, Pre-Commissioning and Marshalling	Foundation Marshalling and Advanced Foundation Component Fabrication	Construction Hub and/or O&M Activities	Commercial Fishing
Port of New London	New London	New London, CT	X			X
Stonington	Stonington	New London, CT				X
Fairhaven	Fairhaven	Bristol, MA				X
New Bedford Marine Commerce Terminal	New Bedford	Bristol, MA	X			X
Westport	Westport	Bristol, MA				X
Chilmark/ Menemsha	Chilmark	Dukes, MA				X
Sparrow's Point	Edgemere	Baltimore, MD		X		
Paulsboro Marine Terminal	Paulsboro	Gloucester, NJ	X	X		
Port of Montauk	Montauk	Suffolk, NY			X	X
Port Jefferson	Brookhaven	Suffolk, NY			X	
Port of Brooklyn	Brooklyn	Kings, NY			X	
Port of Providence*	Providence	Providence, RI	X	X		
Port of Galilee/ Point Judith	Narragansett	Washington, RI			X	X

Port/ Facility Name/ Place Name	City/Town	County, State	WTG Tower, Nacelle and Blade Storage, Pre-Commissioning and Marshalling	Foundation Marshalling and Advanced Foundation Component Fabrication	Construction Hub and/or O&M Activities	Commercial Fishing
Port of Davisville at Quonset Point	North Kingstown	Washington, RI			X	
Newport	Newport	Newport, RI				X
Little Compton	Little Compton	Newport, RI				X
Port of Norfolk/ Norfolk International Terminal	Norfolk	Norfolk City, VA	X			

Sources: Developed based on data from Table 3.3.10-1 in the COP (for ports directly related to the Project) and data from NMFS (2021).

Note: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* The Port of Providence is also designated as the location of "electrical activities and support" in the COP.

Affected Environment: This subsection describes demographic characteristics and trends in the GAA. Table 3.11-2 describes each potentially affected county and city/town in terms of its area in square miles, population change between 2010 and 2020, population density, and median household income. A change in population has the potential to drive beneficial or adverse changes in other socioeconomic variables such as availability of housing and demand for public infrastructure and services.

Among the potentially affected counties, Kings County, New York, had the largest population, with over 2.7 million residents, as well as the highest population density. Within the GAA, population declined in only New London County, Rhode Island, which experienced a 2% decline. Dukes County, Massachusetts, had the largest gain among counties, with nearly a 25% increase since 2010. Five of the listed cities and towns experienced population declines—New London and Stonington in Connecticut, Narragansett and Little Compton in Rhode Island, and Norfolk City in Virginia.

Table 3.11-2. Population and Median Income by City/Town and County

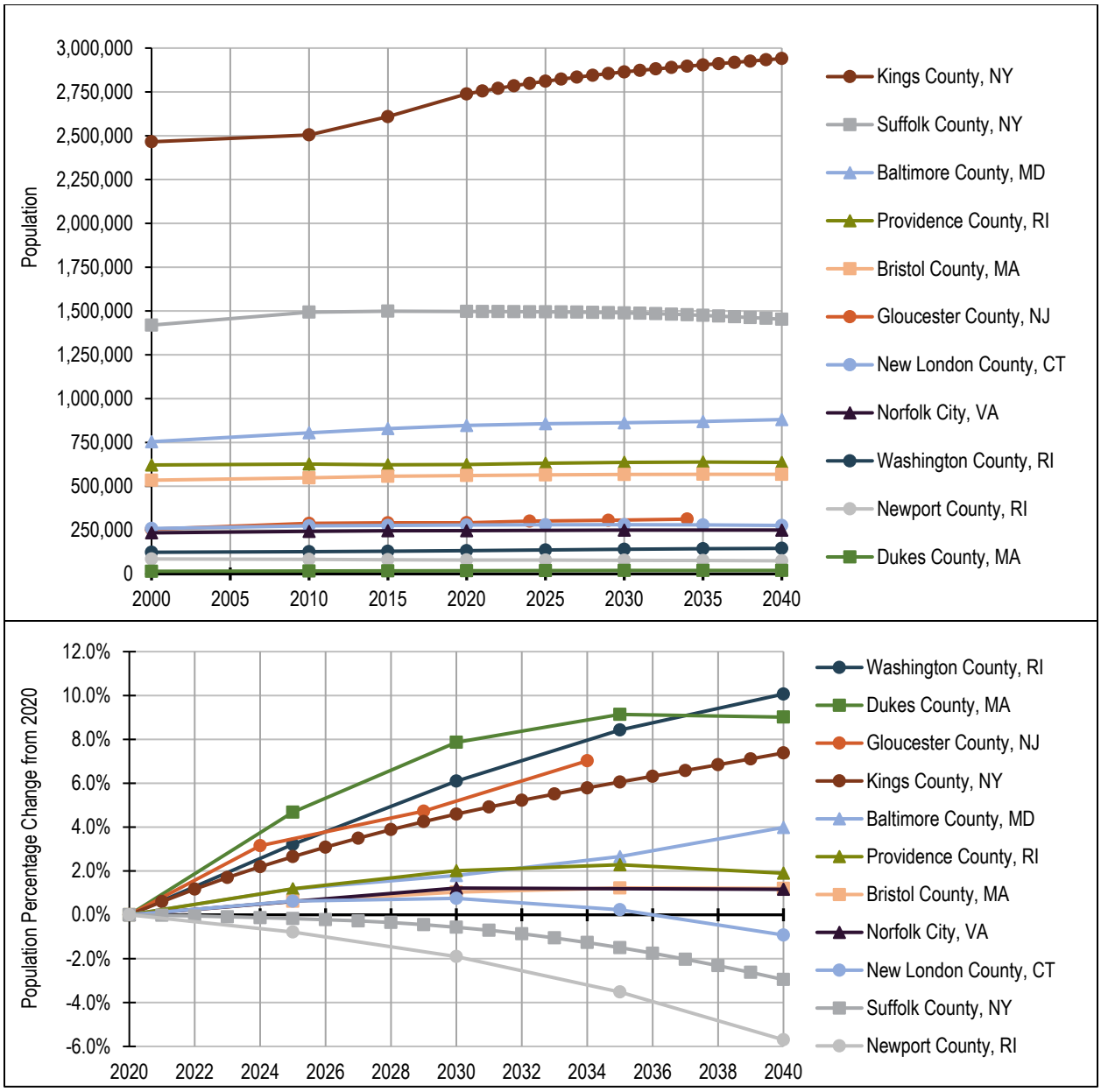
State/County/City or Town		Land Area (square miles)	Population (2010)	Population (2020)	Population Percent Change (2010–2020)	2020 Population Density (population/ square mile)	Median Household Income (2019)
Connecticut	New London County	665	274,055	268,555	-2.0%	404	$73,490
	New London	6	27,620	27,367	-0.9%	4,870	$46,298
	Stonington	39	18,545	18,335	-1.1%	474	$81,667
Massachusetts	Bristol County	553	548,285	579,200	5.6%	1,047	$69,095
	New Bedford	20	95,072	101,079	6.3%	5,054	$46,321
	Fairhaven	12	15,873	15,924	0.3%	1,291	$67,394
	Westport	50	15,532	16,339	5.2%	328	$79,895
	Dukes County	103	16,535	20,600	24.6%	200	71,811
	Chilmark/ Menemsha	19	866	930	7.4%	49	$96,471
Maryland	Baltimore County	598	805,029	854,535	6.1%	1,428	$76,866
	Edgemere	11	8,669	9,069	4.6%	837	$80,307
New Jersey	Gloucester County	322	288,288	302,294	4.9%	939	$87,283
	Paulsboro Borough	2	6,097	6,196	1.6%	3,261	$45,450
New York	Kings County (Brooklyn Borough)	71	2,504,700	2,736,074	9.2%	38,634	$60,231
	Suffolk County	912	1,493,350	1,525,920	2.2%	1,673	$101,031
	Montauk	17	3,326	3,685	10.8%	211	$96,389
	Port Jefferson	3	7,750	7,962	2.7%	2,602	$111,442

State/County/City or Town		Land Area (square miles)	Population (2010)	Population (2020)	Population Percent Change (2010–2020)	2020 Population Density (population/ square mile)	Median Household Income (2019)
Rhode Island	Providence County	410	626,667	660,741	5.4%	1,614	$58,974
	Providence	18	178,042	190,934	7.2%	10,377	$45,610
	Washington County	329	126,979	129,839	2.3%	394	$85,531
	Narragansett	14	15,868	14,532	-8.4%	1,046	$86,920
	North Kingstown	43	26,486	27,732	4.7%	643	$91,796
	Newport County	102	82,888	85,643	3.3%	836	$79,454
	Newport	8	24,672	25,163	2.0%	3,281	$67,102
	Little Compton	21	3,492	3,462	-0.9%	169	$89,353
Virginia	Norfolk City	54	242,803	238,005	-2.0%	4,398	$51,590

Sources: Unless otherwise noted, data are developed from U.S. Census Bureau (2021a). Data for Chilmark, Massachusetts, are from Wikipedia (2021a), Census Reporter (2021), and U.S. Census Bureau (2021b). Data for Montauk, New York, are from Wikipedia (2021b) and Census Reporter (2021). Data for Little Compton, Rhode Island, are from Wikipedia (2021c), Census Reporter (2021), and U.S. Census Bureau (2021).

Note: Population data for Montauk, New York, for 2020 are actually estimates for 2019.

Figure 3.11-2 shows past and forecasted trends in population through 2040 for the counties in the GAA. The top panel contains population counts forecasts, and the lower panel shows the projected future percentage change from the 2020 population estimate. While the available population forecasts do not all use the same base year or the same set of assumptions with respect to future changes, they generally represent the best publicly available information. Four counties (Washington County, Rhode Island; Gloucester County, New Jersey; Kings County, New York, and Baltimore County, Maryland), have forecasts with increasing populations throughout the 20-year period. Population forecasts for four counties increase initially but then flatten while still remaining greater than 2020 (Dukes County, Massachusetts, Providence County, Rhode Island; Bristol County, Massachusetts; and Norfolk County, Virginia). Lastly, three counties are projected to see populations decline in the long run (New London County, Connecticut; Suffolk County, New York; and Newport County, Rhode Island).



Sources: Connecticut State Data Center (2018); Cornell Program on Applied Demographics (2018); Demographics Research Group (2019); Maryland State Data Center (2017); New Jersey Dept. of Labor and Workforce Development (2014); Rhode Island Statewide Planning Program (2013); UMASS Donahue Institute (2018).

Figure 3.11-2. Population trends and forecasts of counties in the analysis area, 2000 to 2040.

3.11.1.1 Economic Characteristics within the Geographic Analysis Area

This subsection summarizes economic characteristics of counties and states in the GAA, including gross domestic product (GDP) and employment. The GDP values represent the market value of goods and services produced by the labor and property located within a geographic area, but they do not include the value of intermediate or used goods in the area. A focus of this analysis is the GDP for the "ocean economy," which includes economic activity dependent upon the ocean, such as commercial fishing and seafood processing, marine construction, commercial shipping and cargo handling facilities, ship and boat

building, marine minerals, harbor and port authorities, passenger transportation, boat dealers, and ocean-related tourism and recreation (National Ocean Economics Program 2020).

Most counties in the GAA display diverse economic activity, and many have well-developed ocean-based economic sectors. In particular, the ocean-related recreation and tourism sector plays a substantial role in many county economies affected by the Project (see Section 3.18). In addition, commercial fishing fleets are important to coastal communities by generating employment and income for vessel owners and crews and creating demand for shoreside products and services to maintain vessels and process seafood products (see Section 3.9). The marine transportation sector is expanding in some coastal counties, with the larger regional ports seeing increased vessel visits and undertaking upgrades to accommodate the increased utilization.

Table 3.11-3 summarizes trends in the annualized total GDP and ocean economy GDP of potentially affected states and counties. Among states, New York had both the largest total GDP and ocean economy GDP, and it experienced the largest increase in total GDP and ocean economy GDP over the period from 2005 to 2019. Among counties, Kings County, New York, experienced a 200% increase in its ocean economy GDP from 2009 to 2019, while the ocean economy GDPs of Dukes County, Massachusetts, Washington County, Rhode Island, and Baltimore County, Maryland, more than doubled in size. Norfolk City, Virginia, was the only county to experience a decline in its ocean economy GDP.

Table 3.11-3. Annualized Total and Ocean Economy Gross Domestic Product of Counties and States in the Geographic Analysis Area

State/County	2005 Total GDP (millions of 2019 $)	2019 Total GDP (millions of 2019 $)	2005–2019 Percentage Change	Percent of Analysis Area Total GDP in 2019	2005 Ocean Economy GDP (millions of 2019 $)	2019 Ocean Economy GDP (millions of 2019 $)	2005–2019 Percentage Change	2019 Ocean Economy GDP as a Percentage of 2019 Total GDP
Connecticut	**$266,338**	**$287,822**	**8.1%**	**6.6%**	**$3,774**	**$4,763**	**26.2%**	**1.7%**
New London County	$19,980	$19,957	-0.1%	–	$1,770	$2,449	38.3%	12.3%
Maryland	**$339,610**	**$426,747**	**25.7%**	**9.8%**	**$5,598**	**$9,015**	**61.0%**	**2.1%**
Baltimore County	$49,170	$59,077	20.1%	–	$314	$691	119.8%	1.2%
Massachusetts	**$441,748**	**$596,593**	**35.1%**	**13.8%**	**$5,461**	**$8,004**	**46.6%**	**1.3%**
Bristol County	$22,413	$29,132	30.0%	–	$545	$671	23.2%	2.3%
Dukes County	$1,475	$2,337	58.4%	–	$44	$126	186.1%	5.4%
New Jersey	**$562,253**	**$634,784**	**12.9%**	**14.6%**	**$8,838**	**$11,348**	**28.4%**	**1.8%**
Gloucester County	$12,356	$15,134	22.5%	–	$208	$280	34.1%	1.9%
New York	**$1,291,963**	**$1,772,261**	**37.2%**	**40.9%**	**$20,147**	**$34,117**	**69.3%**	**1.9%**
Kings County	**$66,023**	**$111,344**	**68.6%**	**–**	**$635**	**$2,086**	**228.2%**	**1.9%**
Suffolk County	$75,510	$97,132	28.6%	–	$1,494	$2,654	77.6%	2.7%

State/County	2005 Total GDP (millions of 2019 $)	2019 Total GDP (millions of 2019 $)	2005–2019 Percentage Change	Percent of Analysis Area Total GDP in 2019	2005 Ocean Economy GDP (millions of 2019 $)	2019 Ocean Economy GDP (millions of 2019 $)	2005–2019 Percentage Change	2019 Ocean Economy GDP as a Percentage of 2019 Total GDP
Rhode Island	**$57,609**	**$61,884**	**7.4%**	**1.4%**	**$2,348**	**$3,298**	**40.5%**	**5.3%**
Providence County	$34,732	$37,080	6.8%	–	$683	$809	18.6%	2.2%
Washington County	$6,068	$7,222	19.0%	–	$545	$1,208	121.5%	16.7%
Newport County	$5,837	$6,069	4.0%	–	$684	$794	16.1%	13.1%
Virginia	**$460,585**	**$556,905**	**20.9%**	**12.8%**	**$8,615**	**$9,954**	**15.5%**	**1.8%**
Norfolk City	$24,608	$24,009	-2.4%	–	$1,414	$1,318	-6.8%	5.5%
Geographic analysis area	**$3,420,105**	**$4,336,996**	**26.8%**	**100.0%**	**$54,781**	**$80,500**	**46.9%**	**1.8%**

Sources: National Ocean Economics Program (2020); U.S. Bureau of Economic Analysis (2021)

Note: A detailed list of economic sectors and industries that the National Ocean Economics Program defines as the ocean economy is available at https://www.oceaneconomics.org/Market/sectors.asp.

Table 3.11-4 summarizes the employment characteristics of counties and states with a potentially affected port, including the size of the labor force, the number of persons employed, and the unemployment rate in 2020. The size of the labor force in each county generally tracks the county's population size, with the largest labor force present in urban areas. Among counties, Kings County, New York, had the largest labor force in 2019, with 1.15 million workers, while Dukes County, Massachusetts, had the smallest labor force, with 9,517 workers. As a result of the COVID-19 pandemic, the percent of the labor force that was unemployed was high throughout the GAA in 2020, with unemployment rates ranging from 6% in Virginia to 10% in New York. By comparison, in 2019, these two states had unemployment rates of 3% and 4%, respectively.

Table 3.11-4. Employment Characteristics of Potentially Affected States and Counties, 2020

State/County	Estimated Size of Labor Force	Estimated Number of Persons Employed	Percentage of Labor Force Unemployed
Connecticut	**1,872,632**	**1,724,623**	**7.9%**
New London County	131,992	119,313	9.6%
Massachusetts	**3,658,322**	**3,334,128**	**8.9%**
Bristol County	293,532	263,456	10.2%
Dukes County	9,517	8,640	9.2%
Maryland	**3,172,798**	**2,958,288**	**6.8%**
Baltimore County	445,695	415,263	6.8%
New Jersey	**4,495,167**	**4,055,261**	**9.8%**
Gloucester County	151,080	137,052	9.3%
New York	**9,289,174**	**8,361,007**	**10.0%**
Kings County	1,151,130	1,006,852	12.5%
Suffolk County	764,564	699,613	8.5%
Rhode Island	**541,680**	**490,844**	**9.4%**
Providence County	320,264	287,648	10.2%
Washington County	65,736	60,597	7.8%
Newport County	42,502	39,038	8.2%
Virginia	**4,346,658**	**4,075,246**	**6.2%**
Norfolk City	111,825	102,074	8.7%
States in GAA	**27,376,431**	**24,999,397**	**8.7%**
Counties in GAA	**3,902,497**	**3,513,621**	**10.0%**

Source: U.S. Bureau of Labor Statistics (2021)

3.11.1.2 Future Offshore Wind Activities (without Proposed Action)

Appendix E includes estimates of future offshore wind energy development along the U.S. east coast, including the number of WTGs and MW capacity that are projected to be installed and the timing of the

construction period and projected years when operations would begin. Approximately 17 separate offshore wind development projects are in planning phases through 2030. Together, by 2030, these wind farms could add more than 20,000 MW of renewable energy into the energy grid from Massachusetts to North Carolina using the same geographic range of ports that has been specified in the COP for the Project.

3.11.1.2.1 Construction and Installation

Employment and Economic Activity Impacts of Construction and Installation

This analysis uses the Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) developed by National Renewable Energy Laboratory (NREL) (2017) to estimate the potential economic impacts of offshore wind energy development within the GAA.[25] The current JEDI-OWM does not have the ability to fully distinguish between the economic impacts of offshore versus onshore activities and facilities related to offshore wind energy development. Therefore, the economic impacts of future offshore wind energy projects (without the Proposed Action) predicted by the model are presented separately from the description of the impacts of the projects' offshore and onshore activities and facilities. The primary data inputs for the JEDI-OWM are based on information in Table E-1 in Appendix E and Project design parameters described in Table E3-1 in Appendix E3.

Table 3.11-5 shows projected employment from existing and future offshore wind developments within the GAA for the years 2021 to 2030 under the No Action Alternative. Most of the direct construction-related jobs would be attributed to either the community hosting the regional headquarters of the Project developer or the fabrication and storage ports that would be used. In general, the specific locations of the regional fabrication and storage ports for specific projects have not been announced, with the exception of New Bedford being selected for the Vineyard Wind project. It can also be inferred that most of the engineering and construction of both onshore and offshore facilities are included in the direct jobs, while most of the component fabrication, storage, and transport are included in the indirect jobs. The induced jobs effect occurs almost entirely onshore as income generated from the direct and indirect jobs is spent throughout the local economy.

[25] The JEDI-OWM is an interactive spreadsheet model developed and maintained by the NREL (NREL 2017). The JEDI-OWM was used in Guidehouse, Inc. (Guidehouse) (2020) to generate estimates of the economic impacts of the Project, as reported in the COP. As described in Appendix G, the current release of JEDI-OWM Release 2021-2 (NREL 2021)—which includes the ability to estimate project capital costs with three alternative WTGs capacities (6 MW, 10 MW, and 15 MW)—was used as a data source for capital costs of various sizes of WTGs. These capital cost estimates were then input into the 2017 version of JEDI-OWM to generate estimates of economic impacts (employment, income, total output, and value-added) discussed in this section.

Table 3.11-5. Estimated Jobs during Construction in the Geographic Analysis Area under the No Action Alternative, 2021 to 2030

Job Category	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Direct jobs	248	3,380	12,267	13,714	13,483	7,180	4,724	4,315	4,315	0
Indirect jobs	348	5,378	20,714	23,093	21,515	11,055	7,029	6,398	6,398	0
Induced jobs	251	3,167	12,960	15,765	14,973	7,429	4,315	3,919	3,919	0
Total jobs	**847**	**11,925**	**45,942**	**52,572**	**49,971**	**25,664**	**16,068**	**14,632**	**14,632**	**0**

Source: Estimates were developed using the JEDI-OWM (NREL 2017, 2021).

Note: Jobs during the period shown include preconstruction jobs. All jobs are defined as full-time equivalents (FTEs), or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year).

BVG Associates, Ltd. (2017) analyzed the specific occupations required for offshore wind energy development in the United States. The occupations demanded included technician-level workers in 1) production roles, particularly high-value manufacturing positions; 2) installation and commissioning positions; 3) vessel and offshore equipment operation; and 4) commissioning and testing turbines, cables, and substations. The report notes that a particular value of offshore wind energy jobs is that many are created in industrialized coastal areas that have suffered from economic decline in recent years. Offshore wind could play an important part in reversing that situation. However, the number of jobs created during offshore wind energy project construction would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts of construction of future offshore wind energy projects would be localized, temporary, and **minor**.

In communities with ports used for staging and fabrication, offshore wind energy development could temporarily compete with the local commercial fishing industry for marine workers. This competition could exacerbate current fishing industry labor shortages. Recent studies (e.g., Johnson and Mazur 2018) show that some commercial fisheries in the New England and mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. In addition, the increased economic activity during the construction phase of offshore wind energy projects could temporarily increase competition for some onshore facilities and services, thereby resulting in higher prices for these facilities and services. With an increase in prices, some businesses in the commercial fishing industry and other marine sectors could seek facilities and services in ports not supporting offshore wind development. Overall, offshore wind energy development is expected to have a short-term, **negligible** to **minor** adverse impact on local supplies of labor and goods and services.

The increased employment opportunities created during construction of offshore wind energy projects could result in population increases in those communities with ports used for staging and fabrication of projects. In turn, these population increases could reduce local housing availability and strain existing public infrastructure and services. However, while some non-local workers could need temporary housing depending on the ports selected, it is expected that the majority of workers involved in the installation of the offshore wind energy facilities would be housed onboard vessels and would be expected to work for several weeks at sea before returning to shore. These conditions suggest that offshore construction crews would have little incentive to relocate to a port community. Therefore, construction of offshore wind energy projects would have a short-term **negligible** to **minor** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services.

In addition to supporting the employment described above, BOEM expects construction of future offshore wind energy projects to affect demographics, employment, and economics through the following IPFs.

Offshore Activities and Facilities

Light: The view of nighttime lighting during construction of offshore wind energy structures could have adverse impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized short term **negligible** to **moderate** adverse based on the observed distance and individual responses by tourists to changes in the viewshed.

New cable emplacement/maintenance: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: adverse, short term, and **minor** to **moderate**.

Presence of structures: An analysis of the impacts of construction of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, adverse impacts to demographic, employment, or economic conditions in the GAA would be short term and **minor** to **moderate**.

Vessel traffic: Vessel traffic related to offshore wind energy project construction could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. In addition, the risk of collisions that result in costly vessel damage and loss could increase. These vessel traffic changes would represent a short-term, **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA.

Onshore Activities and Facilities

Port utilization: Offshore wind energy projects would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to port facilities (see Section 3.16). In addition, the use of multiple ports to support offshore wind energy project development would reduce the related congestion impacts in any one port. Therefore, adverse impacts to

demographic, employment, or economic conditions in the GAA during offshore wind energy project construction are expected to be localized, short term, and **minor** to **moderate**.

Some ports could undertake upgrades to support offshore wind energy development. These types of upgrades are described in Appendix E. In addition, see Whitney et al. (2016) for a summary of the current status of U.S. ports, as well as some of the planned and implemented port expansions to further support offshore wind energy development. The construction activities associated with these port improvements would support marine service industries and provide employment opportunities for shore-based and marine workers. Overall, construction of port improvements related to offshore wind energy development would have long-term, **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

Vehicular traffic: Activities associated with construction of the onshore and offshore facilities of offshore wind energy projects would result in temporary, localized traffic delays along impacted roads (see Section 3.14). These traffic delays can cause temporarily restrict access to adjacent commercial properties. State and local agencies would be responsible for managing actions to help minimize and avoid traffic delays and other impacts on nearby businesses during construction. On this basis, the adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short-term, **negligible** to **minor**.

3.11.1.2.2 Operations and Maintenance and Decommissioning

Employment and Economic Activity Impacts of O&M and Decommissioning

As discussed above, the JEDI-OWM does not have the ability to distinguish between the employment impacts of offshore versus onshore activities and therefore the results of the model are presented in advance of the offshore and onshore discussion.

Table 3.11-6 shows projected employment during O&M of future offshore wind energy projects within the GAA.[26] Most of the direct O&M-related jobs generated by projects would occur in the communities where the ports used to support ongoing project activities are located, together with the communities hosting the regional headquarters of project developers. O&M occupations would include turbine technicians and water transportation workers (BVG Associates, Ltd. 2017). The number of jobs created during O&M activities of offshore wind energy projects would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts during the O&M phases of future offshore wind energy projects would be localized, long term, and **minor**. Impacts during project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete.

[26] Employment estimates have been developed only for those future projects in the Atlantic OCS for which BOEM reports a development schedule within Appendix E, all of which are included in Table 3.11-6.

Table 3.11-6. Estimated Jobs during Operations and Maintenance in the Geographic Analysis Area under the No Action Alternative, 2021 to 2030

Job Category	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Direct jobs	3	3	3	112	239	473	546	559	559	695
Indirect jobs	15	15	15	624	1,318	2,713	3,127	3,203	3,203	3,955
Induced jobs	6	6	6	228	476	1,031	1,202	1,232	1,232	1,507
Total jobs	23	23	23	963	2,032	4,218	4,875	4,995	4,995	6,157

Source: Estimates were developed using the JEDI-OWM (NREL 2017, 2021).

Note: All jobs are defined as FTEs, or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year).

In addition to supporting the employment described above, BOEM expects O&M of future offshore wind energy projects to affect demographics, employment, and economics through the following IPFs. Impacts during project decommissioning would be similar to impacts during construction.

Offshore Activities and Facilities

Light: The view of nighttime aviation warning lighting required for offshore wind energy structures could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized and short term, with **negligible** to **moderate** adverse impacts, based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse, as the amount of time WTGs would be visible at night would decrease (see Section 3.20).

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.1.1.1) and as the presence of structures impact rating: short term and **minor** to **moderate** adverse.

Presence of structures: Offshore wind energy development would result in the installation of an estimated 10,024 miles of offshore export and inter-array cables and 3,008 offshore foundations.[27] An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that

[27] These estimates of cable miles and foundations include only those projects for which BOEM reports development schedules within Appendix E, all of which are included in Table 3.11-6.

fishing businesses could continue to operate with minimal disruption. Therefore, adverse impacts to demographic, employment, or economic conditions in the GAA would be short term **minor** to **moderate**.

Vessel traffic: Vessel traffic related to offshore wind energy project O&M would be similar to the construction phases of projects (see Section 3.11.1.1.1) except that a reduced number of vessels would be required for routine maintenance during the operations phase. Therefore, vessel traffic changes would represent a long-term **negligible** to **minor** adverse impact to demographic, employment, or economic conditions in the GAA.

Onshore Activities and Facilities

Port utilization: During offshore wind energy project O&M, port facilities would be required for vessels used for routine maintenance of offshore project components. These vessels would require berthing and would add traffic to port facilities. However, in comparison to the construction phases of projects, O&M would likely require a reduced number of vessels. Given the relatively low number of vessels, the adverse impacts of the changes in port facility accessibility to demographic, employment, or economic conditions in the GAA would be long term and **minor**.

Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development as well as marine transportation. Additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind energy industry. Moreover, port improvements would support and enhance other port activities. Overall, the port investment and usage generated by offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

Vehicular traffic: Actions associated with O&M of the onshore and offshore facilities of offshore wind energy projects could result in localized traffic delays along impacted roads (see Section 3.14). However, the increase in traffic caused by projects is expected to be minimal, and it is not expected to disrupt normal business activities in the GAA. On this basis, the adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be long term **negligible** to **minor**.

3.11.1.3 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts associated with the Project would not occur. However, ongoing and future offshore wind activities and non–offshore wind activities would have continuing impacts on demographic, employment, and economic conditions in the GAA.

Considering all the IPFs together for offshore wind activities, BOEM anticipates that the overall impacts of future offshore wind energy development on demographic, employment, and economic conditions in the GAA would be short term during construction and long term during O&M and **moderate** adverse. This rating primarily reflects adverse impacts to employment and economic activity in commercial fisheries. Overall beneficial impacts of future offshore wind energy development would be short term during construction and long term during O&M; these beneficial impacts would be **minor**. This beneficial rating primarily reflects new job formation associated with offshore wind development.

Ongoing and future non–offshore wind activities as described in Appendix E would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the GAA as a result of climate change and the associated risks of flooding, extreme heat, and storm damage. Ongoing and future non–offshore wind activities would also have long-term, **moderate** beneficial impacts on some local economies, driven primarily by the ongoing operation of existing marine industries in parts of the GAA, especially commercial fishing, recreation/tourism, and shipping.

BOEM anticipates that the adverse impacts associated with future offshore wind activities in the GAA combined with ongoing and reasonably foreseeable activities other than offshore wind would be long term and **major** as a result of climate change. Long-term **moderate** beneficial impacts would occur in some local economies, representing notable and measurable improvements as a result of ongoing economic development.

3.11.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). From the perspective of potential Project impacts to demographic, employment, or economic conditions in the GAA, the key design parameters are total Project capacity, turbine size, and number of WTGs installed. If total Project capacity is larger and if similar-sized WTGs are used, then the number of WTGs must increase and the economic impacts during the construction phase would also increase. Similarly, if the number of WTGs is constant and the capacity of the individual turbines is larger (thus increasing the total capacity of the Project), then economic impacts during the construction phase would be greater. Economic impacts during the O&M phase are directly linked to total Project capacity. If total Project capacity increases, then total economic impacts during O&M would increase.

In addition, specified construction periods for individual Project components (inclusive of commissioning) affect the duration of economic impacts, while the selection of ports that support various Project activities and facilities will determine where economic impacts are likely to occur. Two other factors that affect local economic impacts of the Project include the local hiring practices of Revolution Wind and the ability of local and U.S. industries to meet the manufacturing and component demands of the Project. These two factors are described in more detail in Appendix G.

See Appendix E1 for a summary of IPFs analyzed for demographics, employment, and economics across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-7 in Appendix E1.

Table 3.11-7 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Under all of the options overall impact to demographics, employment, and economics from any alternative would be **minor** adverse as most adverse impacts on affected activities or communities could be avoided; impacts would not disrupt the normal or routine functions of affected activities or communities; or affected activities or communities would return to a condition with no measurable effects without remedial or mitigating action.

Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

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Table 3.11-7. Comparison of Evaluated Impact-Producing Factors under included Alternatives for Demographics, Employment, and Economics

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Employment and economic activity generated by offshore wind energy	Under the No Action Alternative, BOEM estimates that 34 GW of offshore wind farm capacity would be installed and operational by 2030. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. From 2021–2031, it is expected that an annual average of over 23,000 jobs would be created as a result of the design and construction of offshore wind projects if direct, indirect, and induced jobs are included. By 2030, O&M activities related to future offshore wind projects are expected to support over 6,000 annual FTE jobs if direct, indirect, and induced jobs are included. Notwithstanding the above, the number of jobs created during offshore wind energy project construction and O&M would be small relative to the total number of jobs in the GAA. Therefore, the beneficial direct employment impacts of construction and O&M phases of future offshore wind energy projects would be localized, temporary to long-term, and **minor**. Impacts during project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete. Overall, offshore wind energy development is expected to have a short-term, **negligible** to **minor** adverse impact on local supplies of labor and goods and services. Population increases from increased employment opportunities could reduce local housing availability and strain existing public infrastructure and services. Therefore, construction of offshore wind energy projects would have a short-term **negligible** to **minor** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services.	Employment and economic activity impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term to long term **minor** beneficial. Construction would also have a short-term **negligible** adverse impact on local supplies of labor and goods and services and demographic-related variables such as housing availability and demand for public infrastructure and services for all design configurations analyzed under the Proposed Action. Decommissioning of the Project's offshore facilities is estimated to take 2 years to complete. Because labor and contracting would account for a substantial portion of decommissioning costs, a relatively high percentage of decommissioning expenditures are expected to accrue to local economies. Therefore, decommissioning would have a short-term **minor** beneficial impact. Under the Proposed Action, BOEM estimates that annual average construction jobs would increase by 2.1% relative to the No Action Alternative, and that O&M jobs would increase by as much as 4.7%. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics.	See Section 3.11.2.3 for analysis.			
Light	**Offshore**: The view of nighttime lighting could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on	**Offshore**: The view of nighttime lighting during construction of offshore facilities could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Impacts on businesses dependent on tourism would be localized and short term **negligible** to **moderate** adverse,	**Offshore**: By omitting certain WTG positions or eliminating WTGs adjacent to or overlapping certain transit lanes Alternatives C through F would reduce the impact of light to the tourism industry. However, the light impact rating for recreation and tourism would be similar to that for the Proposed Action (see Section 3.18): short term **negligible** to **moderate** adverse for construction and long term **negligible** adverse for O&M and decommissioning.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	tourism would be localized short term **negligible** to **moderate** adverse during construction, O&M, and decommissioning based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse.	based on the observed distance and individual responses by tourists to changes in the viewshed for all design configurations analyzed under the Proposed Action. Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F) and visual impacts on recreation and tourism during O&M. These impacts, while long term, are expected to be **negligible** adverse. Adverse impacts on businesses dependent on tourism would be localized and short term during construction and long term during operations, with **negligible** to **moderate** adverse impacts based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs, impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action, as the amount of time WTGs would be visible at night would decrease (see Section 3.20).	The lighting impact of Alternatives C through F on the tourism industry would not be markedly different from the Proposed Action (see Section 3.18). Therefore, the cumulative impacts of light to demographic, employment, or economic conditions in the GAA would be similar to those under the Proposed Action: long term **negligible** to **minor** adverse if ADLS (or a similar system) is installed on WTGs.			
New cable emplacement/ maintenance	**Offshore**: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). The new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: short term, and **minor** to **moderate** adverse.	**Offshore**: The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include a decrease in employment or economic activity due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement and maintenance impact rating would be the same as the presence of structures impact rating: adverse, short term during construction/decommissioning and long term during operations, and **minor** to **moderate** adverse.	**Offshore**: If the number of inter-array cables is reduced under Alternatives C through F, the adverse economic impact of new cable emplacement on commercial and for-hire recreational fisheries would be diminished. However, the new cable emplacement and maintenance impact rating for commercial fisheries and for-hire recreational fishing would be similar to that for the Proposed Action (see Section 3.9): short term **minor** to **moderate** adverse.			
Presence of structures	**Offshore**: Offshore wind energy development would result in the installation of an estimated 10,024 miles of offshore export and inter-array cables and 3,008 offshore foundations. An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. Adverse impacts to demographic,	**Offshore**: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project construction and O&M as a result of the installation and presence of structures, including WTGs and OSSs. However, Revolution Wind's communication plans with the fishing industry would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors, and shoreside support services, could continue to operate with minimal disruption. Therefore, adverse impacts to employment and economic activity in the fishing industry would be short to long term **minor** to **moderate** adverse. The Proposed Action in addition to other future offshore wind energy development would result in the installation of an estimated 10,263 miles of offshore export and inter-array cables and 3,110 offshore foundations. Therefore, adverse economic impacts to commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate** adverse during	**Offshore**: By omitting certain WTG positions or eliminating WTGs adjacent to or overlapping certain transit lanes, Alternatives C through F would reduce the adverse economic impact of the presence of structures on commercial and for-hire recreational fisheries. However, the presence of structures impact rating for commercial fisheries and for-hire recreational fishing would be similar to that for the Proposed Action (see Section 3.9): short term to long term **minor** to **moderate** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	employment, or economic conditions in the GAA would be short term and **minor** to **moderate**.	construction/decommissioning and long term **minor** to **moderate** adverse during operations.				
Port utilization	**Onshore**: Offshore wind energy projects would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users. Therefore, adverse impacts to demographic, employment, or economic conditions in the GAA during offshore wind energy project construction are expected to be localized, short term, and **minor** to **moderate**. Construction activities associated with port improvements would support marine service industries and provide employment opportunities for shore-based and marine workers. Overall, construction of port improvements related to offshore wind energy development would have long-term, **minor** to **moderate** beneficial impacts. During offshore wind energy project O&M, port facilities would be required for vessels used for routine maintenance of offshore project components. However, in comparison to the construction phases of projects, O&M would likely require a more limited number of vessels. Therefore, impacts would be long term and **minor** adverse. Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development as well as marine transportation. Overall, the port investment and usage generated by offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts.	**Onshore**: The Proposed Action would require vessels for staging and installation during construction. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users. Adverse port utilization impacts during offshore wind energy Project construction are expected to be localized, short term **minor** to **moderate** adverse. During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. Given the relatively low number of vessels, the adverse impacts on the accessibility of port facilities would be long term **minor** adverse. Offshore wind energy projects, including the Proposed Action, would require vessels for staging and installation during construction, routine maintenance during operations, and deinstallation during decommissioning. This additional vessel volume could cause delays or changes in berthing patterns at ports, and it could result in reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users. Cumulative port utilization impacts are expected to be **minor** to **moderate** adverse, localized, and short term during construction and decommissioning and long term during operations. Any the port investment and usage generated by offshore wind energy development would also have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.	**Onshore**: Construction of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as those described for the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively long term **minor** to **moderate** adverse and beneficial.			
Vessel traffic	**Offshore**: Vessel traffic related to offshore wind energy project construction and O&M could cause congestion and delays. In addition, the risk of collisions that result in costly vessel damage and loss could increase. These vessel traffic changes would represent a short-term, **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA. In comparison to the construction phases of projects, a more limited number of vessels would likely be required for routine maintenance during the operations phase.	**Offshore**: Vessel traffic related to offshore wind energy Project construction could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses. In addition, the risk of collisions that result in costly vessel damage and loss could increase (see Section 3.16). These vessel traffic changes would represent a short-term **minor** to **moderate** adverse impact. Project O&M would require a more limited number of vessels, and the majority of vessels would be smaller in size (vhb 2022). Therefore, the adverse impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be long term **minor** adverse.	**Offshore**: Under Alternatives C through F, vessel traffic would be similar to that for the Proposed Action (see Section 3.16). Therefore, the impact to demographic, employment, or economic conditions in the GAA would be similar to that for the Proposed Action: short term **minor** to **moderate** adverse for construction and decommissioning, long term **minor** adverse for O&M, and cumulatively short term **minor** to **moderate** during construction and decommissioning, and long term **minor** during operations.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	Therefore, the reduction of vessel traffic would represent a long-term **negligible** to **minor** adverse impact.	The cumulative impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be short term **minor** to **moderate** adverse during construction/decommissioning and long term and **negligible** to **minor** adverse during operations.				
Vehicular traffic	**Onshore**: Activities associated with construction and O&M of the onshore and offshore facilities of offshore wind energy projects would result in temporary, localized traffic delays along impacted roads (see Section 3.14). Adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short to long term, **negligible** to **minor adverse**.	**Onshore**: Some materials and equipment would arrive by land at varying frequencies throughout the construction period. This additional traffic could result in temporary, localized traffic delays that impact nearby businesses. Construction and O&M of the onshore facilities of the Proposed Action could also result in temporary, localized traffic delays that impact nearby businesses (see Section 3.14). On this basis, the overall effects of vehicular traffic would be short term to long term and **negligible** to **minor** adverse.	**Onshore**: Construction and operation of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts to demographic, employment, or economic conditions in the GAA would be the same as those described for the Proposed Action: short term to long term **negligible** to **minor** adverse.			

3.11.2.2 Alternative B: Impacts of the Proposed Action on Demographics, Employment, and Economics

3.11.2.2.1 Construction and Installation

Employment and Economic Activity Impacts of Construction and Installation

The analysis in this section is based on the economic analysis of the impacts of construction and operations of the Project described in the COP, and on additional information provided in Appendix CC to the COP, which has been deemed confidential by Revolution Wind. In the COP and Appendix CC, Guidehouse (2020) develops impact estimates for a single project configuration with a total nameplate capacity of 712 MW that would use 89 8-MW WTGs. In the assessment that follows this configuration is referred to as the "Baseline" Project. Additional information on the estimation of economic impacts during the construction and operation phases can be found in the Demographics, Employment, and Economics section of Appendix G.

Although the Proposed Action could be configured exactly as in the "Baseline Project," the flexibility built into the PDE would allow many other design capacity options that could have a relative wide range of impacts. To summarize the range of potential configurations, this assessment of the Proposed Action describes four separate project design capacity options (Table 3.11-8).

Table 3.11-8. Project Design Capacity Options

Option Name	Description
Baseline Project	Nameplate capacity of 712 MW and would use 89 8-MW WTGs*
Large WTG Baseline Project	Nameplate capacity of 720 MW, which would use 60 12-MW WTGs
Large WTG Maximum Capacity Project	Capacity of 876 MW and would use 73 12-MW WTGs
Maximum Capacity Project	Capacity of 880 MW and would use 88 10-MW WTGs

Note: It is also technically possible that the Project could use 100 8-MW WTGs for a total capacity of 800 MW, but because this design capacity option does not provide as great of a generating capacity as other design capacity options using larger WTGs and is projected to have considerably higher capital costs per MW of power generated than the other design capacity options, it is not carried forward for further assessment.

* As discussed in the Demographics, Employment, and Economics Section in Appendix G, Revolution Wind has indicated that they would install at least one additional WTG beyond the minimum number of WTGs required to meet the PPA (Roll 2021). Based on this information, a 712 MW project using 89 8-MW WTGs is the smallest project they would build. If they opted to use 10-MW WTGs they would install at least 72 WTGs for a 720 MW project, even though they could technically meet the PPA with 71 10-MW WTGs. Similarly, if they used 12-MW WTGs they would install 60 WTGs with a total capacity of 720 MW.

Table 3.11-8 shows the estimated employment, earnings, output, and value-added impacts of each the four design configurations. Most of the direct construction-related jobs generated by the Proposed Action would occur in the communities where the ports used for staging and fabrication are located. Most of the direct jobs would occur during engineering and construction of onshore and offshore wind energy facilities, while most of the indirect jobs would occur during wind energy component fabrication, storage, and transport. The induced jobs would occur as income generated from the direct and indirect jobs is spent throughout the local economy. Under the Proposed Action, construction is expected to occur within a 2-year period, but preconstruction activities such as design/engineering and component manufacturing

and fabrication could lengthen the period an additional year. Where possible, local workers would be hired to meet labor needs for construction (see Table F-1 in Appendix F).

Table 3.11-9. Estimated Jobs, Earnings, Output, and Value Added during Construction of the Proposed Action by Design Capacity Option

Design Capacity Option	Jobs	Earnings ($ millions)	Output ($ millions)	Value Added ($ millions)
Baseline Project (712-MW capacity with 89 8-MW WTGs)				
Direct impacts	1,440	$124.40	$148.83	$130.10
Indirect impacts	1,623	$123.00	$497.43	$205.80
Induced impacts	793	$51.10	$137.63	$81.10
Total impacts	**3,856**	**$298.50**	**$783.90**	**$417.00**
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)				
Direct impacts	1,483	$121.13	$142.64	$128.36
Indirect impacts	1,789	$135.89	$563.62	$227.54
Induced impacts	827	$53.11	$142.83	$84.31
Total impacts	**4,100**	**$310.13**	**$849.08**	**$440.21**
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)				
Direct impacts	1,705	$134.78	$154.62	$141.63
Indirect impacts	2,265	$171.58	$738.27	$291.92
Induced impacts	1,006	$64.52	$173.36	$102.36
Total impacts	**4,976**	**$370.88**	**$1,066.25**	**$535.91**
Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs)				
Direct impacts	1,706	$135.89	$157.60	$142.23
Indirect impacts	2,134	$161.84	$690.11	$275.84
Induced impacts	995	$64.02	$172.10	$101.56
Total impacts	**4,834**	**$361.75**	**$1,019.80**	**$519.63**

Source: Baseline Project estimates are from Guidehouse (2020). Estimates for Large WTG Baseline Project, the Maximum Capacity Project, and the Large WTG Maximum Capacity Project were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value added is the estimated change in GDP resulting from the change in output.

As shown in Table 3.11-8, the Large WTG Maximum Capacity Project is the design configuration expected to have the greatest beneficial impacts in terms of employment, earnings, output, and value added. It would generate an estimated 4,976 FTE jobs during the 3-year preconstruction/construction period, with the majority of these jobs occurring in Rhode Island and Connecticut. If this increase in employment was evenly spread over the 3-year period, the annual FTE jobs created would be approximately 1,659, or less than 0.1% of the total labor force in Rhode Island and Connecticut in 2020 (see Table 3.11-4). Therefore, the employment impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term **minor** beneficial.

Table 3.11-8 also shows that over the preconstruction/construction period, the Large WTG Maximum Capacity Project is expected to generate nearly $536 million in value-added production to the combined GDP of Rhode Island and Connecticut. If this impact is realized in a single year, the value-added amount would represent 0.15% of the annual GDP for Rhode Island and Connecticut combined (see Table 3.11-3). Therefore, the economic activity impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be short term **minor** beneficial.

In communities with ports used for staging and fabrication, construction activities could temporarily compete with the local commercial fishing industry for marine workers. As described in Section 3.9.2.2.1, some commercial fisheries in the New England and mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. The competition for marine workers during Project construction could also result in higher prices for certain local shoreside support services. With an increase in service prices, some businesses in the commercial fishing industry and other marine sectors could seek services in ports not supporting Project construction.

The increased employment opportunities created during construction could result in population increases in those communities with ports used for staging and fabrication. In turn, these population increases could reduce local housing availability and strain existing public infrastructure and services. However, while some non-local workers could need temporary housing depending on the ports selected, it is expected that the majority of workers involved in the installation of offshore facilities would be housed onboard vessels and would be expected to work for several weeks at sea before returning to shore. These conditions suggest that offshore construction crews would have little incentive to relocate to a port community. In addition, local hiring practices by Revolution Wind contractors would mitigate population increases. Therefore, construction would have a short-term **negligible** adverse impact on demographic-related variables such as housing availability and demand for public infrastructure and services for all design configurations analyzed under the Proposed Action.

Offshore Activities and Facilities

Light: During construction and installation, adverse impacts on businesses dependent on tourism would be the same as the No Action Alternative (see Section 3.11.1.1.1) (i.e., localized and short term with **negligible** to **moderate** adverse impacts) based on the observed distance and individual responses by tourists to changes in the viewshed for all design configurations analyzed under the Proposed Action.

New cable emplacement/maintenance: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of the offshore transmission cable and inter-array cables. The impacts of new cable emplacement/maintenance to demographic, employment, and economic conditions in the GAA would be

the same as the No Action Alternative (see Section 3.11.1.1.1) and as the presence of structures impact rating: short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of WTGs and OSSs. However, only a small number of commercial fishing vessels depend heavily on harvests in the Lease Area for their fishing revenue, and many fishing vessel operators have the ability to adjust transit and fishing locations to avoid conflicts with construction activities. In addition, Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear, as described in Orsted U.S. Offshore Wind (2020), would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors, and shoreside support services, could continue to operate with minimal disruption. Therefore, adverse impacts to employment and economic activity in the fishing industry would be short term **minor** to **moderate** for all design configurations analyzed under the Proposed Action.

Vessel traffic: Vessel traffic related to Project construction would be the same as the No Action Alternative (see Section 3.11.1.1.1) and would represent a short-term **minor** to **moderate** adverse impact to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action.

Onshore Activities and Facilities

Port utilization: Port utilization activities during Project construction would be the same as the No Action Alternative (see Section 3.11.1.1.1). Therefore, adverse port utilization impacts during offshore wind energy Project construction are expected to be localized, short term **minor** to **moderate** for all design configurations analyzed under the Proposed Action.

Economic benefits could accrue to ports that undertake improvements to support the development of the Proposed Action. However, while selected ports could require upgrades to meet the construction needs of the Proposed Action (see Table 3.3.10-1 in vhb [2021]), no specific port improvements have been proposed as part of the Proposed Action.

Vehicular traffic: It is expected that most offshore components of the Proposed Action would be transported by sea. However, some materials and equipment would arrive by land at varying frequencies throughout the construction period. Vehicular traffic would include truck and automobile traffic over existing roads and highways proximate to the marshaling and/or logistics facilities in the ports(s) where Project staging, assembly, and fabrication occur. This additional traffic could result in temporary, localized traffic delays that impact nearby businesses. See Section 3.14 for additional details related to traffic impacts. However, the proposed ports currently experience fluxes in traffic volumes during normal operations, and Project-related traffic is expected to be well within these daily fluctuations in traffic. Moreover, maintenance and protection of traffic setups would be implemented to minimize impacts to traffic (see Table F-1 in Appendix F).

Construction of the onshore facilities of the Proposed Action could also result in temporary, localized traffic delays that impact nearby businesses (see Section 3.14). Revolution Wind will coordinate with local authorities during construction of onshore facilities to minimize local traffic impacts. In addition, the

construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day (see Table F-1 in Appendix F). On this basis, the overall effects of vehicular traffic on demographics, employment, and economics during construction of offshore and onshore facilities would be short term **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action.

3.11.2.2.2 Operations and Maintenance and Decommissioning

Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

Table 3.11-9 shows estimated employment, earnings, output, and value-added impacts during O&M of the Proposed Action for the four design configurations described above. The JEDI-OWM assumes that impacts of O&M activities are directly proportional to nameplate capacity regardless of the number of WTGs. The O&M impacts presented in Table 3.11-9 would occur annually over the expected 35-year life of the Project. The Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, Port of Brooklyn, and Port of Montauk have been identified as possible ports supporting O&M of the Proposed Action (vhb 2022). Where possible, local workers would be hired to meet labor needs for O&M (see Table F-1 in Appendix F).

Table 3.11-10. Estimated Jobs, Earnings, Output, and Value Added during Operations and Maintenance of the Proposed Action by Design Capacity Option

Design Capacity Option	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Baseline Project (712-MW capacity with 89 8-MW WTGs)	233	$17.20	$85.70	$70.00
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	236	$17.39	$86.66	$70.79
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)	287	$21.16	$105.44	$86.12
Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs)	288	$21.26	$105.92	$86.52

Source: Baseline Project estimates are from Guidehouse (2020). Estimates for Large WTG Baseline Project, the Maximum Capacity Project, and the Large WTG Maximum Capacity Project were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

As shown in Table 3.11-9, the Large WTG Maximum Capacity Project is expected to generate a total of 287 FTE jobs annually. If this increase in employment completely occurred in Washington County, Rhode Island, it would represent 0.47% of the total employment in the county in 2020 (see Table 3.11-4). Similarly, if all of the O&M jobs are located in Suffolk County, New York, they would represent 0.04% of employed persons in the county in 2020 (see Table 3.11-4). Therefore, the employment impacts of the Proposed Action under the Large WTG Maximum Capacity Project configuration would be long term **minor** beneficial.

Decommissioning of the Project's offshore facilities is estimated to take 2 years to complete. BOEM estimates that decommissioning costs would be approximately half of the Project construction costs (AECOM 2017), with economic impacts (jobs and income) estimated to be approximately 50% of those shown in Table 3.11-8. Because labor and contracting would account for a substantial portion of decommissioning costs, a relatively high percentage of decommissioning expenditures are expected to accrue to local economies. Therefore, decommissioning would have a short-term **minor** beneficial impact to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action. There would be no further demographic, employment, and economic impacts once decommissioning is complete.

Offshore Activities and Facilities

Light: To the extent that lighting for offshore Project facilities decreases tourist visitation rates, employment and economic activity in service industries that support tourism would be adversely affected. However, Revolution Wind has committed to implement ADLS as an EPM to reduce light impacts (see Table F-1 in Appendix F) and visual impacts on recreation and tourism during O&M. Therefore, the adverse impacts of light to demographic, employment, or economic conditions in the GAA are expected to be long term but **negligible** for all design configurations analyzed under the Proposed Action.

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.1.1.1) and as the presence of structures impact rating: short term **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: As described in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during O&M as a result of the presence of WTGs and OSSs. However, only a small number of commercial fishing vessels depend heavily on harvests in the Lease Area for their fishing revenue, and many fishing vessel operators have the ability of to adjust transit and fishing locations to avoid conflicts with Project offshore facilities and activities. In addition, WTG spacing and orientation measures and offshore cable burial, together with Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind (2020), would help ensure that fishing industry sectors, including harvesting operations, seafood processors and distributors and shoreside support services, could continue to operate with minimal disruption. Therefore, adverse impacts to employment and economic activity in the fishing industry would be long term **minor** to **moderate** for all design configurations analyzed under the Proposed Action.

Vessel traffic: In comparison to the construction phase, Project O&M would require a reduced number of vessels, and most of the vessels would be smaller in size (vhb 2022). Although the number of vessel transits would increase during O&M relative to construction, O&M vessel traffic would not have the same influx of a large number of vessels during a compressed time period seen during construction (see Section 3.16). Therefore, the adverse impacts of vessel traffic to demographic, employment, or economic conditions in the GAA would be long term **minor** for all design configurations analyzed under the Proposed Action.

Onshore Activities and Facilities

Port utilization: During Project O&M, port facilities would be required for vessels used for routine maintenance of offshore Project components. These vessels would require berthing and would add traffic to port facilities. However, in comparison to the construction phase, Project O&M would require a reduced number of vessels (vhb 2022) (see Section 3.16). Given the relatively low number of vessels, the adverse impacts on the accessibility of port facilities would be long term **minor** for all design configurations analyzed under the Proposed Action.

Vehicular traffic: Vehicular traffic impacts associated with O&M of the onshore and offshore facilities of the Proposed Action would be the same as the No Action Alternative (see Section 3.11.1.1.2) and would be long term **negligible** to **minor** for all design configurations analyzed under the Proposed Action.

3.11.2.2.3 Cumulative Impacts

Employment and Economic Activity Impacts of Combined Offshore Wind Energy Projects

Under the Proposed Action, BOEM estimates that 34.7 GW of offshore wind farm capacity would be installed and operational by 2030. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. Construction activities related to future offshore wind energy projects are expected to generate an average of more than 23,700 FTE job-years from 2021 to 2030, including direct, indirect, and induced jobs. If the Maximum Capacity Project is installed under the Proposed Action, it would account for 2.1% of those job-years. By 2030, O&M activities related to future offshore wind projects are expected to support nearly 6,450 annual FTE jobs if direct, indirect, and induced jobs are included, with the Maximum Capacity Project under the Proposed Action accounting for approximately 4.7% of those jobs. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics.

Offshore Activities and Facilities

Light: The view of nighttime lighting during construction and operations of offshore wind energy structures, including the Proposed Action, could have impacts on employment and economic activity in the tourism industry by affecting the decisions of tourists in selecting coastal locations to visit (see Section 3.18). Adverse impacts on businesses dependent on tourism would be localized and short term during construction and long term during operations, with **negligible** to **moderate** adverse impacts based on the observed distance and individual responses by tourists to changes in the viewshed. If ADLS (or a similar system) is installed on WTGs (as it would be for the Project), impacts to demographic, employment, or economic conditions in the GAA would be reduced to **negligible** to **minor** adverse for all design configurations analyzed under the Proposed Action, as the amount of time WTGs would be visible at night would decrease (see Section 3.20).

New cable emplacement/maintenance: The impacts of new cable emplacement and maintenance to demographic, employment, and economic conditions in the GAA would be the same as the No Action Alternative (see Section 3.11.1.1.1) and as the presence of structures impact rating: adverse, short term during construction/decommissioning and long term during operations, and **minor** to **moderate** adverse for all design configurations analyzed under the Proposed Action.

Presence of structures: The Proposed Action in addition to other future offshore wind energy development would result in the installation of an estimated 10,263 miles of offshore export and inter-array cables and 3,110 offshore foundations.[28] The Proposed Action would account for 2% of the additional offshore and inter-array cable and 3% of the additional offshore foundations. An analysis of the impacts of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities, including the Proposed Action, result in declines in the economic performance of commercial and for-hire recreational fisheries, workers employed in these fisheries, including fishing vessel crewmembers and seafood processor workers, could be adversely affected. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, adverse economic impacts to commercial fisheries and for-hire recreational fishing would be short term **minor** to **moderate** during construction/decommissioning and long term **minor** to **moderate** during operations for all design configurations analyzed under the Proposed Action.

Vessel traffic: Vessel traffic related to construction and installation, O&M, and decommissioning of offshore wind energy projects, including the Proposed Action, could cause congestion and delays, thereby increasing vessel fuel costs (i.e., for vessels forced to wait for port traffic to pass) and decreasing productivity for commercial shipping businesses (see Section 3.16). In addition, the risk of collisions that result in costly vessel damage and loss could increase. However, in comparison to the construction phases of projects, a reduced number of vessels would likely be required for routine maintenance during the operations phase. Therefore, the adverse impacts of vessel traffic to demographic, employment, or economic conditions in the GAA for all design configurations analyzed under the Proposed Action would be short term **minor** to **moderate** during construction/decommissioning and long term and **negligible** to **minor** during operations.

Onshore Activities and Facilities

Port utilization: Offshore wind energy projects, including the Proposed Action, would involve port utilization activities as described under the No Action Alternative (see Section 3.11.1.1.1). Therefore, port utilization impacts for all design configurations analyzed under the Proposed Action are expected to be **minor** to **moderate** adverse, localized, and short term during construction and decommissioning and long term **minor** adverse during operations.

Offshore wind energy projects could generate employment opportunities and economic activity at ports used to support O&M of projects through port upgrades and development, as well as marine transportation. Additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind energy industry. Moreover, port improvements would support and enhance other port activities. While selected ports could require upgrades to meet the construction needs of the Proposed Action, no specific port improvements have been proposed as part of the Proposed Action. Therefore, the economic benefits of the Proposed Action are uncertain. Overall, however, the port

[28] Based on planned future Atlantic OCS wind projects as described in Table E-1 in Appendix E.

investment and usage generated by offshore wind energy development would have long-term **minor** to **moderate** beneficial impacts to demographic, employment, or economic conditions in the GAA.

Vehicular traffic: Actions associated with construction and installation, O&M, and decommissioning of the onshore and offshore facilities of offshore wind energy projects, including the Proposed Action, could result in localized traffic delays along impacted roads (see Section 3.14). These traffic delays can temporarily restrict access to adjacent commercial properties. State and local agencies would be responsible for managing actions to help minimize and avoid traffic delays and other impacts on nearby businesses. On this basis, the adverse effects of the additional vehicular traffic to demographic, employment, or economic conditions in the GAA would be short term **negligible** to **minor** during construction and decommissioning, and long term **negligible** to **minor** during operations for all design configurations analyzed under the Proposed Action.

3.11.2.2.4 Conclusions

As a result of the employment and economic activity supported by Project construction, O&M, and decommissioning, BOEM expects the Proposed Action to have an overall long-term **minor** beneficial impact on demographic, employment, and economic conditions in the GAA for all design configurations analyzed under the Proposed Action.

Considering all the IPFs together, BOEM anticipates that the overall adverse impacts of future offshore wind energy development, including the Proposed Action, on demographic, employment, and economic conditions in the GAA would be short term during construction, long term during O&M, and **moderate**. This rating primarily reflects adverse impacts to employment and economic activity in commercial fisheries. Overall beneficial impacts of future offshore wind energy development would be short term during construction, long term during O&M, and **minor**. This rating primarily reflects new job formation associated with offshore wind development.

Ongoing and future non–offshore wind energy activities would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the GAA as a result of climate change and the associated risks of flooding, extreme heat, and storm damage. Ongoing and future non–offshore wind energy activities would also have long-term **moderate** beneficial impacts on some local economies, driven primarily by the ongoing operations of existing marine industries in parts of the GAA, especially commercial fishing, recreation/tourism, and shipping.

Overall, BOEM anticipates that the adverse impacts associated with future offshore wind activities in the GAA combined with ongoing and reasonably foreseeable activities other than offshore wind would be long term **major** as a result of climate change. Long-term **moderate** beneficial impacts would occur in some local economies, representing notable and measurable improvements as a result of ongoing economic development.

3.11.2.3 Alternatives C, D, E, and F

Table 3.11-7 provides a summary of IPF findings for these alternatives.

3.11.2.3.1 Construction and Installation

Employment and Economic Activity Impacts of Construction and Installation

Tables 3-11.10, Table 3.11-11, Table 3.11-12 and Table 3.11-13 show estimated total employment, total earnings, total output, and total value-added impacts during construction under Alternatives C through F for the range of feasible design configurations. As with the Proposed Action, the exact locations of these economic impacts cannot be determined because the final set of ports has not been specified.

The higher-end projections of employment and economic activity during construction of the Habitat Alternative are smaller than the higher-end projections under the Proposed Action. However, the lower-end and higher-end estimates of the economic impacts of the Transit Alternative across design configurations are not markedly different from those for the Proposed Action. Feasible projects under Alternative E and F also result in similar levels of economics impacts as are expected under the Proposed Action. Therefore, the impacts of Alternatives C through F to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

Table 3.11-11. Estimated Jobs, Earnings, Output, and Value Added during Construction under the Habitat Alternative by Design Capacity Option

Design Capacity Option	Habitat Alternative for which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	C1 and C2	4,100	$310.13	$849.08	$440.21
780-MW Project with 65 12-MW WTGs	C1	4,330	$325.90	$899.10	$463.10
768-MW Project with 64 12-MW WTGs	C2	4,231	$317.44	$882.97	$452.15

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value added is the estimated change in GDP resulting from the change in output.

The assessment of Alternative C builds of the Project configurations described for the Proposed Action in Section 3.11.2.2.1. If no more than 65 WTGs are allowed under Alternative C1, the Large WTG Baseline Project (720 MW with 60 12-MW WTGs) from the Proposed Action could be installed while still meeting the PPA under Alternative C1. However, none of the other three design configurations described in the Proposed Action could be installed. The largest design configuration possible under Alternative C1 would be a 780-MW project with 65 12-MW WTGs. The largest design configuration possible under Alternative C2 would be a 768-MW project with 64 12-MW WTGs.

Table 3.11-12. Estimated Jobs, Earnings, Output, and Value Added during Construction under the Transit Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Baseline Project (712-MW capacity with 89 8-MW WTGs)	D1, D2, or D3	3,856	$298.50	$783.90	$417.00
Midsize -WTG Baseline Project (720-MW capacity with 72 10-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	3,918	$297.25	$801.90	$419.82
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	4,100	$310.13	$849.08	$440.21
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	4,976	$370.88	$1,066.25	$535.91
Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs)	D1, D2, or D3	4,834	$361.75	$1,019.80	$519.63

Source: Baseline Project estimates are from Guidehouse (2020). Estimates for the other listed projects were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

If Alternative D1+D2, Alternative D1+D3 or Alternative D2+D3 are selected, then a Midsize WTG Baseline Project (720-MW project with 72 10-MW WTGs), or the Large WTG Baseline Project (introduced in Section 3.11.2.2.1) as could be installed if Revolution Wind's goal is minimally meet the current PPA requirements. If Revolution Wind wishes to maximize its total capacity, then the Large WTG Maximum Capacity Project described in Section 3.11.2.2.1 would be feasible.

If Alternative D1+D2+D3 is selected, then no more than 80 WTGs could be installed. In this case, the Midsize WTG Baseline Project (720-MW project with 72 10-MW WTGs) or the Large WTG Baseline Project could be installed to meet the minimum PPA, while the Large WTG Maximum Capacity Project would be feasible if Revolution Wind maximizes total Project capacity.

Table 3.11-13. Estimated Jobs, Earnings, Output, and Value Added during Construction under the Viewshed Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	E1 and E2	4,100	$310.13	$849.08	$440.21
Midsize-WTG Baseline Project (720-MW capacity with 72 10-MW WTGs)	E2	3,918	$297.25	$801.90	$419.82
64-WTG Maximum Capacity Project (768-MW capacity with 64 12-MW WTGs)	E1 and E2	4,231	$317.44	$882.97	$452.15
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)	E2	4,976	$370.88	$1,066.25	$535.91

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value-added is the estimated change in GDP resulting from the change in output.

Under Alternative E1, there are only five feasible configurations, all of which would use 12-MW WTGs. The 704-MW PPA can be met with the Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs) that was introduced with the Proposed Action. The largest capacity project that could be built is a 64-WTG Maximum Capacity Project (768 MW with 64 12-MW WTGs,) which was also discussed with respect to Alternative C2 in Section 3.11.2.3.1. It would also be possible to build three smaller projects using 61, 62, or 63 WTGs each with 12-MW capacity.

It is clear that all of the design capacity options available for Alternative E1 are also feasible under Alternative E2. Alternative E2 allows up to 8 more WTGs, which would allow the Large WTG Maximum Capacity Project (876-MW project capacity with 73 12-MW WTGs) which was initially introduced in Section 3.11.2.2.1 with the Proposed Action. Also feasible under Alternative E1 are two project configurations that use 10-MW WTGs: a 72-WTG project that meets the PPA with a total capacity of 720 MW; and a 730-MW project that uses one additional 10-MW WTG

Table 3.11-14. Estimated Jobs, Earnings, Output, and Value Added during Construction under the Higher Capacity Turbine Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Very Large WTG Baseline Project (728-MW capacity with 52 14-MW WTGs)	Feasible under all alternatives	4,295	$320.62	$916.04	$461.31
Very Large WTG Maximum Capacity Project (868-MW capacity with 62 14-MW WTGs)	Feasible under all alternatives	5,212	$384.88	$1,140.90	$562.30

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates are for the entire construction period. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours). Earnings are estimated incomes earned from the jobs. Output is the estimated values of all goods and services sold during construction. Value added is the estimated change in GDP resulting from the change in output.

Under Alternative F, the largest allowable WTGs would increase from 12 MW to 14 MW. Therefore, based on information from Roll (2021), the minimum capacity that would be installed to meet the 704-MW PPA would have a total nameplate capacity of 728 MW and would use 52 14-MW WTGs. The largest project that could be installed (within the PDE maximum Project capacity of 880 MW) would be an 868-MW project that uses 62 14-MW WTGs.

Both of these Project configurations would be feasible under the Proposed Action and any of the other alternatives that constrain the number of WTGs that would be allowed (Alternatives C–E).

3.11.2.3.2 Operations and Maintenance and Decommissioning

Employment and Economic Activity Impacts of Operations and Maintenance and Decommissioning

Table 3.11-14, Table 3.11-15, Table 3.11-16, and Table 3.11-17 show estimated employment, earnings, output, and value-added impacts during O&M under Alternatives C through F for the design configurations that are feasible. The tables show total economic impacts, including direct, indirect, and induced impacts.

The higher-end projections of employment and economic activity during O&M of the Habitat Alternative are smaller than the higher-end projections under the Proposed Action. The lower-end and higher-end estimates of the economic impacts of the Transit Alternative and across design configurations and Higher Capacity Turbine Alternative are not markedly different from those for the Proposed Action. Likewise, all of the design configurations under Alternative E fall within the range of design configurations for the Proposed Action. Therefore, the impacts of Alternatives C through F to demographic, employment, or economic conditions in the GAA would be similar to the Proposed Action: short term **minor** beneficial for all design configurations analyzed.

Decommissioning under Alternatives C through F would likely have a smaller impact than the Proposed Action, with economic impacts (jobs and income) estimated to be approximately 50% of those shown in Table 3.11-10, Table 3.11-11, Table 3.11-12, and Table 3.11-13. These impacts would not differ markedly from the Proposed Action. Decommissioning would have a short-term **minor** beneficial impact

to demographic, employment, or economic conditions in the GAA. There would be no further demographic, employment, and economic impacts once decommissioning is complete.

Table 3.11-15. Estimated Jobs, Earnings, Output, and Value Added during Operations and Maintenance under the Habitat Alternative by Design Capacity Option

Design Capacity Option	Habitat Alternative for which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	C1 and C2	236	$17.39	$86.66	$70.79
780-MW Project with 65 12-MW WTGs	C1	255	$18.84	$93.88	$76.69
768-MW Project with 64 12-MW WTGs	C2	251	$18.55	$92.44	$75.51

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

Table 3.11-16. Estimated Jobs, Earnings, Output, and Value Added during Operations and Maintenance under the Transit Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Baseline Project (712-MW capacity with 89 8-MW WTGs)	D1, D2, or D3;	233	$17.20	$85.70	$70.00
Midsize -WTG Baseline Project (720-MW capacity with 72 10-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	236	$17.39	$86.66	$70.79
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	236	$17.39	$86.66	$70.79
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)	D1, D2, D3, D1+D2, D1+D3, D2+D3, or D1+D2+D3	287	$21.16	$105.44	$86.12
Maximum Capacity Project (880-MW capacity with 88 10-MW WTGs)	D1, D2, or D3	288	$21.26	$105.92	$86.52

Source: Baseline Project estimates are from Guidehouse (2020). Estimates for the other listed projects were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

Table 3.11-17. Estimated Jobs, Earnings, Output, and Value Added during Operations and Maintenance under the Viewshed Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Large WTG Baseline Project (720-MW capacity with 60 12-MW WTGs)	E1 and E2	236	$17.39	$86.66	$70.79
Midsize-WTG Baseline Project (720-MW capacity with 72 10-MW WTGs)	E2	236	$17.39	$86.66	$70.79
64-WTG Maximum Capacity Project (768-MW capacity with 64 12-MW WTGs)	E1 and E2	251	$18.55	$92.44	$75.51
Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs)	E2	287	$21.16	$105.44	$86.12

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

Table 3.11-18. Estimated Jobs, Earnings, Output, and Value Added during Operations and Maintenance under the Higher Capacity Turbine Alternative by Design Capacity Option

Design Capacity Option	Alternatives to which the Design Capacity Option is Applicable	Total Jobs	Total Earnings ($ millions)	Total Output ($ millions)	Total Value Added ($ millions)
Very Large WTG Baseline Project (728-MW capacity with 52 14-MW WTGs)	Feasible under all alternatives	238	$17.59	$87.63	$71.57
Very Large WTG Maximum Capacity Project (868-MW capacity with 62 14-MW WTGs)	Feasible under all alternatives	284	$20.97	$104.48	$85.34

Source: Estimates were developed using information and models in Guidehouse (2020) and in NREL (2017, 2021).

Note: Employment, earnings, output, and value-added estimates would occur annually over the 35-year life of the Project. Jobs are reported in terms of FTEs, with one FTE equal to one person working full time for 1 year (2,080 hours).

3.11.2.3.3 Cumulative Impacts

Employment and Economic Activity Impacts of Combined Offshore Wind Energy Projects

Under Alternatives C through F, BOEM estimates that over 34.7 GW of offshore windfarm capacity could be installed and operational by 2030. This offshore wind energy development would create a demand for workers skilled in the professions and trades needed for the design, construction, and O&M of offshore wind energy facilities. Construction activities related to future offshore wind energy projects are expected to generate an average of 23,650 and 23,750 FTE job-years from 2021 through 2030, including

direct, indirect, and induced jobs. Annual O&M jobs with the Project under these alternatives would range between 6,400 and 6,450.

If the highest feasible capacity configurations under Alternative C1 or Alternative C2 are installed, the Project would account for approximately 4% of those job-years. By 2030, O&M activities related to future offshore wind projects are expected to support 6,400 annual FTE jobs, with the largest feasible projects under Alternatives C1 and C2 accounting for approximately 4.1% of those jobs.

If either the Maximum Capacity Project or the Large WTG Maximum Capacity Project is installed under the Transit Alternative, it would account for 2.1% of annual average construction-related jobs from 2021 to 2030. By 2030, O&M activities related to future offshore wind projects are expected to support nearly 6,450 annual FTE jobs if direct, indirect, and induced jobs are included, with the Maximum Capacity Project accounting for approximately 4.7% of those jobs.

If the Large WTG Maximum Capacity Project (876-MW capacity with 73 12-MW WTGs) is installed under Alternative E2, it would account for 2.1% of annual average construction-related jobs from 2021 through 2030. By 2030, O&M activities related to future offshore wind projects are expected to support nearly 6,450 annual FTE jobs if direct, indirect, and induced jobs are included, with the Large WTG Maximum Capacity Project under Alternative E2 accounting for approximately 4.7% of those jobs. If Alternative E1 is selected, the economic impacts would be marginally smaller.

If the Very Large WTG Maximum Capacity Project (868-MW capacity with 62 14-MW WTGs) is installed under the Higher Capacity Turbine Alternative, it would account for 2.2% of annual average construction-related jobs from 2021 to 2030. By 2030, O&M activities related to future offshore wind projects are expected to support nearly 6,450 annual FTE jobs if direct, indirect, and induced jobs are included, with the Very Large WTG Maximum Capacity Project under Higher Capacity Turbine Alternative accounting for approximately 4.6% of those jobs.

Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term **minor** beneficial impacts for demographics, employment, and economics.

3.11.2.3.4 Conclusions

When compared to the maximum case under the Proposed Action, Alternatives C through F under all layout options could reduce the number of WTGs, which would have an associated reduction in job and income losses due to disruption of commercial fisheries or for-hire recreational fishing and a reduction in adverse visual impacts on the tourism industry. However, BOEM expects that the overall level of impacts to demographic, employment, and economic conditions in the GAA resulting from Alternatives C through F alone would be similar to the Proposed Action: long-term, **minor** beneficial for all Project design configurations analyzed as a result of the employment and economic activity supported by Project construction and installation, O&M, and decommissioning.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM expects that Alternatives C through F's impacts to demographic, employment, and economic conditions in the GAA would be similar to the Proposed Action. Therefore, the overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as under the

Proposed Action: long term **major** adverse as a result of climate change. Beneficial impacts would be long term **moderate**, representing notable and measurable improvements in some local economies in the GAA.

3.11.2.4 Mitigation

There are no potential additional mitigation measures for demographics, employment, and economics identified in Table F-2 of Appendix F.

3.12 Environmental Justice

3.12.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Environmental Justice

Geographic analysis area: Following guidance in BOEM (2022), the GAA is large enough to identify any environmental justice communities potentially impacted by the Proposed Action within the following parameters. The GAA includes all counties adjacent to the Lease Area, as well as any area where Project offshore infrastructure may be visible. Counties adjacent to onshore Project infrastructure or ports used to support Project construction, O&M, and decommissioning activities in the Lease Area and along the RWEC are included in the GAA. In addition, the GAA includes counties adjacent to major ports that support commercial fisheries potentially affected by the Project. A map of the GAA is shown in Figure 3.12-1.

In identifying minority and low-income populations in the GAA, this analysis also considered geographically dispersed/transient sets of individuals who may experience common conditions of environmental exposure or effect (see guidance in CEQ [1997]). Environmental justice populations in the GAA that are geographically dispersed and/or transient include low-income and minority workers employed in potentially affected commercial fisheries (see Section 3.9) and service industries that support tourism (see Sections 3.11 and 3.18).

In a recent survey of commercial fishing crewmembers in the northeastern United States, approximately 13% of survey participants identified their race as Black, Asian, American Indian/Alaska Native, or Native Hawaiian/Pacific Islander, and 7% identified as Hispanic or Latino (Silva et al. 2021). Approximately 9% of participants reported annual incomes of less than $30,000. Because of increasing real estate values and tax burdens in many coastal communities in the northeastern United States (Jimenez 2021), many crewmembers, especially those with low incomes, reside in communities far from the ports where fishing vessels are based. According to survey results, the median distance crewmembers reported traveling from their homes to their primary ports was approximately 15 miles (Silva et al. 2021). Many crewmembers that work in the lucrative scallop fishery primarily based in New Bedford, Massachusetts, live in states such as Maine, New Jersey, and Virginia. Over the past several years many U.S. seafood processors have relied on the H-2B visa program to fill lower-wage jobs (National Guestworker Alliance 2016; New American Economy 2017; Strauss 2017). This visa program allows employers to bring low-skilled foreign workers into the United States to fill temporary and seasonal jobs in sectors other than agriculture (Zavodny and Jacoby 2010). It is likely that the majority of these foreign workers hired by seafood processors belong to minority groups given that Mexico, Jamaica, Guatemala, and South Africa are among the primary home countries of H-2B visa workers (Batalova et al. 2021).

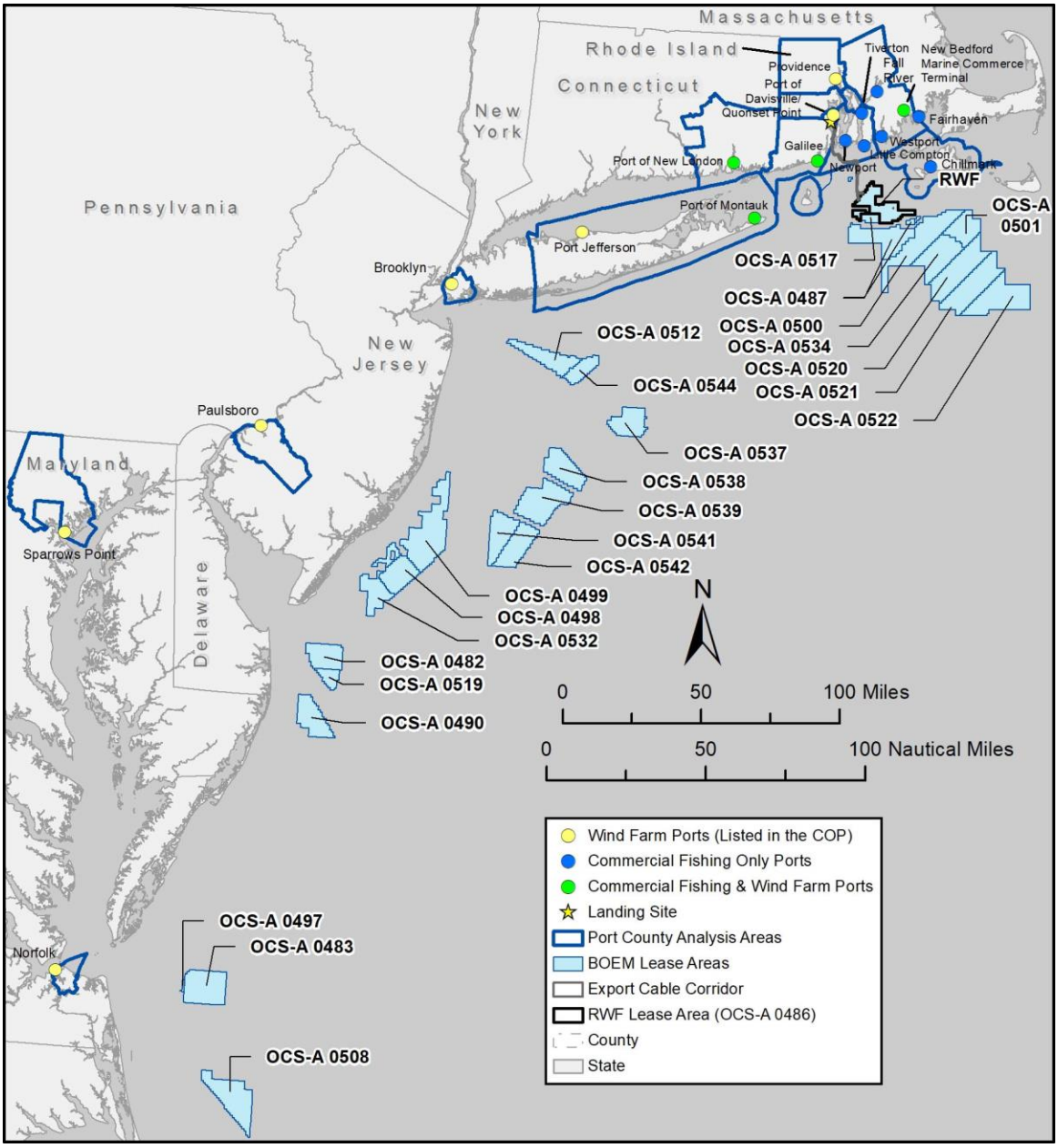

Figure 3.12-1. Geographic Analysis Area for environmental justice.

With respect to low-income and minority workers employed in service industries that support tourism, a large portion of the tourism workforce in the northeastern United States also consists of workers with H-2B visas (Gellerman 2017; Levin 2021; Terry 2018). Many other entry-level tourism jobs are filled by foreign workers with J-1 visas who are participating in the Summer Work Travel program. This program provides international students with an opportunity to work in the United States during their summer vacation from college or university (Forman 2022; Terry 2018). Tourism workers with H-2B or J-1 visas emigrate to the United States during the tourist season and return to their home countries after the season ends. It is likely that many of these individuals are also members of low-income populations since

employees in the tourism-related leisure and hospitality industry have the lowest earnings in the U.S. economy (Dogru et al. 2019).

Another environmental justice community that is geographically dispersed consists of members of Native American tribes for whom there are resources of cultural significance in the GAA. Federally recognized tribal nations in the GAA include the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, and Delaware Nation (see Appendix A). A substantial number of these Native Americans reside within or close to their traditional tribal areas. However, it is likely that tribal members are spread throughout the United States.

Affected environment: Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, Native American tribes, and indigenous peoples" (EPA 2019).[29]

Table 3.12-1 describes environmental justice characteristics of the counties and cities/towns in the GAA. The table includes counties that contain or are adjacent to ports that may be used for Project construction, O&M, and decommissioning; contain major ports and commercial fisheries that could be affected by the Project; or contain the proposed Project landing site and onshore transmission cable. In addition, the table includes counties that contain cities/towns within the proposed visual study area as described in COP Appendix U1 (EDR 2021). The percentage of minority and low-income populations in each county and city/town were determined using the EPA's EJSCREEN tool, an environmental justice screening and mapping tool (EPA 2021b). Within that online tool, minority status determination is based on identifying individuals who are non-white or who are white but have Hispanic ethnicity. Low-income status determination is based on identifying individuals for whom the ratio of household income to the poverty level in the previous 12 months was less than two. Counties in which more than half the population consists of minority groups include Baltimore City, Maryland; Philadelphia, Pennsylvania; Hudson, New Jersey; New York, New York; Kings, New York; Hampton City, Virginia; Portsmouth City, Virginia; Newport News City, Virginia; and Norfolk City, Virginia. Counties in which more than one-third of the population is in the low-income group include Baltimore City, Maryland; Philadelphia, Pennsylvania; Hudson, New Jersey; New York, New York; Portsmouth City, Virginia; Newport News City, Virginia; and Norfolk City, Virginia. Figures G-16 though G-21 show minority population percentages by block group for all counties in the GAA. Figures G-22 through G-27 show low-income population percentages by block groups in the same areas.

[29] The term *indigenous peoples* includes state-recognized tribes; indigenous and tribal community-based organizations; individual members of federally recognized tribes, including those living on a different reservation or living outside Native American country; individual members of state-recognized tribes; Native Hawaiians; Native Pacific Islanders; and individual Native Americans (EPA 2021a).

Table 3.12-1. Environmental Justice Characteristics of Counties and Cities/Towns in the Geographic Analysis Area

County, City/Town, State	Contains or is Adjacent to Staging Port	Contains Major Commercial Fishing Port	Within Visual Study Area	Port or Landing Site	Minority Percentage*	Low-Income Percentage†	City/Town Population Composition Rating‡	City/Town Poverty Rating§	City/Town Personal Disruption Rating¶
New London County, CT	X	X	X		24.1%	22.2%			
New London, CT	X	X		Port of New London	55.9%	41.5%	Med–High	High	High
Stonington, CT		X	X	Stonington	9.1%	15.8%	Med–High	High	High
Bristol County, MA	X	X	X		18.1%	25.4%			
Fairhaven, MA	X	X	X	Fairhaven	9.9%	20.6%	Low	Low	Low
New Bedford, MA	X	X	X	New Bedford Marine Commerce Terminal	38.0%	42.4%	Med–High	High	Med–High
Westport, MA		X	X	Westport	2.7%	16.2%	Low	Low	Low
Dukes County, MA		X	X		13.9%	23.6%			
Chilmark, MA		X	X	Chilmark/ Menemsha	10.0%	20.4%	Low	Low	Low
Anne Arundel County, MD	X				31.0%	14.7%			
Baltimore City, MD	X				72.5%	40.1%			
Baltimore County, MD	X				41.9%	21.9%			
Edgemere, MD	X			Sparrows Point	12.7%	19.9%	Low	Low	Low
Delaware County, PA	X				32.6%	22.6%			
Philadelphia County, PA	X				65.4%	44.4%			
Gloucester County, NJ	X				21.2%	17.1%			

County, City/Town, State	Contains or is Adjacent to Staging Port	Contains Major Commercial Fishing Port	Within Visual Study Area	Port or Landing Site	Minority Percentage*	Low-Income Percentage†	City/Town Population Composition Rating‡	City/Town Poverty Rating§	City/Town Personal Disruption Rating¶
Paulsboro, NJ#	X			Paulsboro Marine Terminal	33.5%	37.1%	Med	High	Med–High
Suffolk County, NY	X	X	X		31.9%	17.1%			
Montauk, NY	X	X	X	Port of Montauk	17.9%	9.5%	Low	Low	Low
Brookhaven, NY	X			Port Jefferson	27.6%	16.7%	Low	Low	Low
Richmond County, NY	X				38.3%	24.0%			
Hudson County NJ	X				71.1%	34.1%			
New York County, NY	X				53.1%	29.5%			
Kings County, NY	X				63.8%	40.1%			
Brooklyn, NY#	X			Port of Brooklyn	63.8%	40.1%	High	High	Med–High
Providence County, RI	X		X		38.5%	32.6%			
Providence, RI	X		X	Port of Providence†	66.5%	46.1%	High	High	High
Washington County, RI	X	X	X		8.9%	18.1%			
Narragansett, RI	X	X	X	Port of Galilee/ Point Judith	6.9%	25.6%	Low	Low	Low
North Kingstown, RI	X		X	Port of Davisville at Quonset Point	8.5%	15.6%	Low	Low	Low
Kent County, RI	X		X		11.0%	20.6%			
Newport County, RI		X	X		14.2%	18.8%			
Newport, RI		X	X	Newport	23.1%	25.8%	Low	Med	Low
Little Compton, RI		X	X	Little Compton	5.3%	14.3%	Low	Low	Low
Tiverton, RI		X	X	Tiverton	5.3%	17.2%	Low	Low	Low

County, City/Town, State	Contains or is Adjacent to Staging Port	Contains Major Commercial Fishing Port	Within Visual Study Area	Port or Landing Site	Minority Percentage*	Low-Income Percentage†	City/Town Population Composition Rating‡	City/Town Poverty Rating§	City/Town Personal Disruption Rating¶
Hampton City, VA	X				61.4%	31.5%			
Portsmouth City, VA	X				62.0%	37.1%			
Newport News City, VA	X				56.6%	34.0%			
Norfolk City, VA	X				56.5%	35.6%			
Norfolk, VA	X			Port of Norfolk/ Norfolk Intl. Terminal	56.5%	35.6%	Med	Med–High	Med–High
Barnstable County, MA			X		10.3%	20.1%			
Nantucket County, MA			X		14.9%	15.4%			
Plymouth County, MA			X		18.7%	17.8%			
Bristol County, RI			X		7.7%	17.6%			

Source: NMFS (2020); EPA (2021b).

Notes: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

Groups of shaded and non-shaded rows represent separate county groups that include the counties in which affected port(s) are located, together with adjacent counties, if any. The last four rows show counties that are within the visual study area but do not contain affected ports.

Minority and low-income percentages are based on 2014–2018 American Community Survey 5-year summary file data obtained from EPA's EJScreen; population composition, poverty, and personal disruption ratings are for 2018.

* Minority percent calculated as 100 percent minus "White alone, non-Hispanic or Latino" percent.

† Low-income percent is "persons in poverty" percent.

‡ Population composition corresponds to the demographic makeup of a community, including the percentage of minorities, the percent of young children and female-headed households, and the ability to speak English. A high rating indicates a more vulnerable population. For additional information see Jepson and Colburn (2013).

§ Poverty is expressed as those receiving assistance, families below the poverty line, and individuals older than 65 and younger than 18 in poverty. A high rating indicates a high rate of poverty and a more vulnerable population. For additional information see Jepson and Colburn (2013).

¶ Personal disruption captures unemployment status, educational attainment, poverty, and marital status. A high rating indicates less personal capacity to adapt to changes and thus a more vulnerable population. For additional information see Jepson and Colburn (2013).

Data reported for the borough.

In addition to showing the minority and low-income percentages in the GAA, Table 3.12-1 presents environmental justice indices provided by NMFS (2020) that describe the social vulnerability of coastal communities engaged in fishing activities in terms of existing local social conditions that are likely to determine how potentially disruptive events affect communities. Brooklyn and Providence have highly vulnerable populations based on demographic makeup; New London, Stonington, New Bedford, Paulsboro, Brooklyn, and Providence have highly vulnerable populations based on poverty level; and New London, Stonington, and Providence have highly vulnerable populations based on personal capacity to adapt to changes. A low population composition and poverty rating for the communities listed in Table 3.12-1 does not necessarily mean that the fishing industries in those communities do not have a high proportion of minority and low-income individuals. As discussed above, a large number of workers in the commercial fishing industry in the GAA, especially those with low incomes, reside in communities far from the ports where fishing vessels are based and where fish are landed and processed.

Following EPA (1999) and EPA (2016a) guidelines, this analysis also identified potential environmental justice areas of concern (i.e., geographical areas that contain relatively high concentrations or "pockets" of minority and/or low-income populations) within cities/towns that contain ports that may be used for Project construction staging or contain the proposed Project landing site and onshore transmission cable. These areas were described at the level of the census block group, which represents the smallest census geographic unit for which both race/ethnicity and income data are readily available. Minority and low-income populations in block groups were identified using the EPA's EJSCREEN tool (EPA 2021b). In accordance with thresholds defined in CEQ (1997), a block group was determined to be a potential environmental justice area of concern if 1) the minority population exceeds 50%, or 2) the minority or low-income population percentage is meaningfully greater than the minority or low-income population percentage in a reference population. The reference population for this analysis is the county in which the block group is located. Using an approach outlined by Hartell (2007) and consistent with guidance in EPA (2016a), the decision threshold when there is a "meaningfully greater" percentage of minority or low-income individuals than in the reference population was based on the following equation:

(minority or low-income population in block group/total population in block group)
divided by
(minority or low-income population in county/total population in county)

If the equation results in a number greater than 1, a greater proportion of minority or low-income individuals resides in the block group than in the county as a whole. This decision threshold is conservative (i.e., any percentage in a given block group that is greater than the percentage in the reference area qualifies as being meaningfully greater).

Based on the above definition, Table 3.12-2 and Table 3.12-3 show the block groups in the cities/towns that contain the Project landing site or ports that may support Project construction, O&M, or decommissioning activities that are potential environmental justice areas of concern. Of the estimated 10,971 total block groups, approximately 50% were determined to be potential environmental justice areas of concern because of the concentrations of minority populations, whereas approximately 44% had concentrations of low-income populations. Cities/towns that contain possible staging ports where more than half of the block groups are potential environmental justice areas of concern include New London, Connecticut; New Bedford, Massachusetts; Paulsboro, New Jersey; Brooklyn, New York; Providence,

Rhode Island; and Norfolk, Virginia. A concentration of minority and low-income populations also occur in a three-census block area to the northwest of the Sparrows Point port facility.

The landfall work area at Quonset Point in North Kingstown, Rhode Island, has been developed for industrial use. The onshore transmission cable route connecting the point of RWEC landfall with the OnSS and ICF would be approximately 1.0 mile long and would begin in the industrial area, follow the existing roadway ROW, and end in an undeveloped area adjacent to the existing Davisville Substation (see Figure 2.1-2). The closest residences to the construction and installation of the onshore transmission cable, ICF, and OnSS are the residences on the south side of Camp Avenue and east side of Mill Creek Drive, which are within a few hundred feet of the construction area. The block group in which all the onshore Project infrastructure would be located is a potential environmental justice area of concern based on both minority population and low-income population criteria. However, the portion of this block group that is immediately adjacent to the landfall envelope area, OnSS, and ICF is limited to industrial, utility, and undeveloped land uses (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure is located is not a potential environmental justice area of concern based on either minority population or low-income population criteria. Figures G-28 through G-33 in Appendix G show the distribution of block groups of potential environmental justice concern in the potentially affected counties. Tables G-EJ1 through G-EJ26 in Appendix G list the multi-digit identifier of each block group of potential environmental justice concern based on minority population, low-income population, or both. The block group identifiers are organized by county and sub-county name (city, town, or census designated place).

Table 3.12-2. Census Block Groups in Counties and Cities/Towns that Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority Populations

County, City/Town, State	Staging Port or Landing Site	Population	Number of Block Groups	Percentage of Block Groups of Potential Environmental Justice Concern Due to Minority Population (%)	Total Population of Block Groups of Potential Environmental Justice Concern Due to Minority Population	Minority Percentage of Population in Block Groups of Potential Environmental Justice Concern (%)
New London County, CT		268,881	188	33.0%	95,319	47.3%
New London, CT	Port of New London	27,032	20	80.0%	20,688	67.3%
Bristol County, MA		558,905	390	41.0%	207,111	35.5%
New Bedford, MA	New Bedford Marine Commerce Terminal	95,117	87	74.7%	70,058	47.6%
Baltimore County, MD		827,625	529	36.7%	359,380	71.2%
Edgemere, MD	Sparrows Point	7,661	8	0.0%	0	0
Census Tract 4213 in Dundalk, MD	Sparrows Point (adjacent area)*	3,281	3	100%	3,281	78.1%
Gloucester County, NJ		290,852	191	34.6%	122,217	35.3%
Paulsboro, NJ	Paulsboro Marine Terminal	5,937	7	71.4%	4,624	41.4%
Suffolk County, NY		1,487,901	999	31.7%	547,678	59.8%
Montauk, NY	Port of Montauk	3,268	5	40.0%	1,470	35.0%
Brookhaven, NY	Port Jefferson	485,363	301	29.9%	162,691	47.2%
Kings County, NY		2,600,747	2,085	61.1%	1,696,907	83.7%
Brooklyn, NY	Port of Brooklyn	2,600,747	2,085	61.1%	1,696,907	83.7%
Providence County, RI		634,533	499	41.1%	260,963	70.4%

County, City/Town, State	Staging Port or Landing Site	Population	Number of Block Groups	Percentage of Block Groups of Potential Environmental Justice Concern Due to Minority Population (%)	Total Population of Block Groups of Potential Environmental Justice Concern Due to Minority Population	Minority Percentage of Population in Block Groups of Potential Environmental Justice Concern (%)
Providence, RI	Port of Providence	179,435	154	79.2%	144,665	76.5%
Washington County, RI		126,242	94	27.7%	46,393	16.9%
Narragansett, RI	Port of Galilee/Point Judith	15,550	12	16.7%	3,128	15.5%
North Kingstown, RI	Port of Davisville at Quonset Point	26,207	20	30.0%	6,890	19.4%
Norfolk City, VA		245,592	189	55.0%	136,196	75.9%
Norfolk, VA	Port of Norfolk/ Norfolk Intl. Terminal	245,592	189	55.0%	136,196	75.9%

Source: EPA (2021b)

Notes: Table includes 2014–2018 American Community Survey 5-year summary file data obtained from EPA's EJScreen.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

* Includes three block groups in Dundalk to the northwest of Sparrows Point (24/005/4213/1, 24/005/4213/2, and 24/005/4213/3).

Table 3.12-3. Census Block Groups in Counties and Cities/Towns that Are Potential Environmental Justice Areas of Concern Due to Concentrations of Low-Income Populations

County, City/Town, State	Staging Port or Landing Site	Population	Number of Block Groups	Percentage of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population (%)	Total Population of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population	Low-Income Percentage of Population in Block Groups of Potential Environmental Justice Concern (%)
New London County, CT		268,881	188	37.2%	99,712	39.0%
New London, CT	Port of New London	27,032	20	75.0%	20,893	49.9%
Bristol County, MA		558,905	390	47.9%	226,236	44.5%
New Bedford, MA	New Bedford Marine Commerce Terminal	95,117	87	81.6%	76,655	48.7%
Baltimore County, MD		827,625	529	39.7%	345,838	35.9%
Edgemere, MD	Sparrows Point	7,661	8	25.0%	1,615	27.0%
Census Tract 4213 in Dundalk, MD	Sparrows Point (adjacent area)*	3,281	3	100%	3,281	56.2%
Gloucester County, NJ		290,852	191	48.7%	122,283	29.1%
Paulsboro, NJ	Paulsboro Marine Terminal	5,937	7	85.7%	5,279	40.5%
Suffolk County, NY		1,487,901	999	41.3%	630,645	28.2%
Montauk, NY	Port of Montauk	3,268	5	0.0%	0	0.0%
Brookhaven, NY	Port Jefferson	485,363	301	45.2%	211,525	26.3%
Kings County, NY		2,600,747	2,085	42.8%	1,237,027	57.6%
Brooklyn, NY	Port of Brooklyn	2,600,747	2,085	42.8%	1,237,027	57.6%

County, City/Town, State	Staging Port or Landing Site	Population	Number of Block Groups	Percentage of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population (%)	Total Population of Block Groups of Potential Environmental Justice Concern Due to Low-Income Population	Low-Income Percentage of Population in Block Groups of Potential Environmental Justice Concern (%)
Providence County, RI		634,533	499	45.7%	286,540	51.7%
Providence, RI	Port of Providence	179,435	154	73.4%	136,695	54.2%
Washington County, RI		126,242	94	45.7%	61,309	26.9%
Narragansett, RI	Port of Galilee/Point Judith	15,550	12	58.3%	8,577	39.2%
North Kingstown, RI	Port of Davisville at Quonset Point	26,207	20	45.0%	8,810	31.6%
Norfolk City, VA		245,592	189	52.9%	145,767	45.5%
Norfolk, VA	Port of Norfolk/ Norfolk Intl. Terminal	245,592	189	52.9%	145,767	45.5%

Source: EPA (2021b)

Notes: Table includes 2014–2018 American Community Survey 5-year summary file data obtained from EPA's EJScreen.

CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

* Includes three block groups in Dundalk to the northwest of Sparrows Point (24/005/4213/1, 24/005/4213/2, and 24/005/4213/3).

Guidance provided by the CEQ (1997) indicates that potential impacts on the social or cultural practices of Native American tribes as a result of impacts to the natural or physical environment should be assessed as potential environmental justice impacts. The connection of Native American tribes to marine fisheries within or in proximity to the RI/MA WEAs has been established in academic literature (Chaves 2014; Trigger 1978). During government-to-government consultations with BOEM, representatives from federally recognized tribes expressed concerns about a variety of potential impacts to culturally significant environmental and physical resources (see Appendix A).

Executive Order 13175 commits federal agencies to engage in government-to-government consultation with tribes, and Secretarial Order No. 3317 requires U.S. Department of the Interior agencies to develop and participate in meaningful consultation with federally recognized tribes where a tribal implication may arise. A description of the government-to-government consultations that BOEM conducted with federally recognized tribes is provided in Appendix A.

3.12.1.1 Future Offshore Wind Activities (without Proposed Action)

3.12.1.1.1 Offshore Activities and Facilities

Air emissions: The largest emissions of regulated air pollutants would occur during construction of future offshore wind energy projects. Project air emissions from vessels, helicopters, generators, and fuel-burning equipment used during construction could have temporary **minor** to **moderate** adverse impacts on air quality, depending on the extent and duration of emissions (see Section 3.4). A large portion of the emissions would not be generated near populated areas but would be generated along the vessel transit routes and at the offshore work areas.

Members of environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful health effects of exposure to air environmental pollution (American Lung Association 2020). Consequently, the adverse impacts to air quality during project construction could result in short-term disproportionately high and adverse health and safety impacts to environmental justice populations near ports used for construction staging. The impacts would be greater if multiple offshore wind projects simultaneously use the same port for construction staging. If construction staging is distributed among several ports, the air emissions would not be concentrated near certain ports, and impacts on proximal environmental justice populations would be less.

During operations, offshore wind energy projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. The reduction in air emissions could produce measurable benefits in terms of lower health costs and loss of life (see Section 3.4). The susceptibility of environmental justice populations to the harmful health effects of air pollution includes exposure to fine particulate matter air pollution from fossil fuel–combusting power generation stations (EPA 2016b; Thind et al. 2019). Given that environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, the beneficial health impacts of reducing air pollution that accrues to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial impact on the health and safety of environmental justice populations through a reduction or avoidance of air emissions and concomitant reduction or avoidance of adverse health impacts.

Climate change: Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change–related events such as heatwaves, heavy flooding, and droughts include where they live, language barriers, their health, and their limited financial resources to cope with these effects (Cho 2020; EPA 2017). Future offshore wind energy project GHG emissions during construction would be short term **negligible** adverse as compared to aggregate global emissions. During O&M, these projects could beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term (see Section 3.4). However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from offshore wind energy development would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations.

Light: The view of nighttime aviation warning lighting required for offshore wind structures could have localized impacts on economic activity by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). To the extent that lighting for offshore wind structures has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected. As described in Section 3.12.1, many of the workers in the service industries that support tourism are members of minority and/or low-income groups. The adverse economic effects of job losses for these workers could be especially severe because they have fewer financial resources to cope with the losses.

Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with negligible to moderate adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed (see Section 3.18). Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **minor** to **moderate** adverse during construction and long term **minor** to **moderate** adverse during O&M. If ADLS (or a similar system) is installed on WTGs in other offshore wind energy projects, impacts to environmental justice populations would be reduced to **negligible** to **minor** adverse, as the amount of time WTGs would be visible at night would decrease (see Section 3.20).

Lighting on WTGs could also affect cultural resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting, but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Light from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catchability of some target species (see Section 3.9). Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor**.

New cable emplacement/maintenance: As described in Section 3.10, cable emplacement resulting from future offshore wind energy development in the GAA could damage submerged ancient landforms that have cultural significance to Native American tribes as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could degrade or eliminate the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. BOEM and relevant State Historic Preservation Offices would require offshore wind energy projects to avoid known resources through the creation of avoidance buffers at ancient submerged landform features identified through geotechnical investigations. These measures would avoid or reduce impacts to marine cultural resources. However, in some cases, the number, extent, and dispersed character of these resources could make avoidance impossible. If an ancient, submerged landform is disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The impact on Native American tribes would be long term **negligible** to **minor** adverse if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.

The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement/maintenance impact level would be the same as the presence of structures impact level: long term **moderate** adverse.

Noise: Underwater noise from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catchability of some target species (see Section 3.9). As described in Section 3.12.1, these businesses are a source of employment and income for minority and/or low-income workers. Given that target species are expected to return to an area after the noise ends (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor**.

The localized adverse noise impacts of future offshore wind activities on fishing could affect low-income residents who substantially rely on recreational fisheries as a food source. Similarly, future offshore wind activities could have adverse impacts on the subsistence fisheries of Native American tribes in the GAA. However, typical recreational fishing locations in the area are close to shore (within 1 mile of the coast) (see Section 3.18). In addition, historically, much of the fishing by the region's Native American tribes was concentrated in the nearshore marine and estuarine environment (Bennett 1955). Recent BOEM consultation with Native American tribes in Lease Areas adjacent to the Project indicate that tribal subsistence fisheries continue to occur predominately in inshore areas (BOEM 2020). Consequently, future offshore wind energy projects are expected to have a long-term **negligible** to **minor** adverse impact on the recreational and subsistence fishing activities of environmental justice populations.

Presence of structures: An analysis of the impacts of installation of offshore wind energy structures, including WTGs and offshore submarine cables, to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.9. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations

could be disproportionately affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other EPMs and BOEM-required mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction, O&M, and decommissioning activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, adverse economic impacts to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate**.

As described in Section 3.10, offshore construction of WTG and OSS foundations could damage submerged ancient landforms that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could degrade or eliminate the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. BOEM and relevant State Historic Preservation Offices would require offshore wind energy projects to avoid known resources through the creation of avoidance buffers at ancient, submerged landform features identified through geotechnical investigations. These measures would avoid or reduce impacts to marine cultural resources. However, in some cases, the number, extent, and dispersed character of these resources could make avoidance impossible. If an ancient submerged landform is disturbed during offshore construction, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources.

The construction of the offshore components of offshore wind energy projects would modify the existing viewshed during the daytime because a number of WTG structures would be visible on the horizon (see Section 3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views of the ocean from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures could disproportionately adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Vessel traffic: Vessel traffic from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA (see Section 3.9). To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. Given that the potential for vessel congestion and gear conflict is expected to be long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be long term and **minor** to **moderate**.

Onshore Activities and Facilities

Accidental releases and discharges: Onshore facilities of future offshore wind activities could affect water quality via accidental spills. See Section 3.21 and Section 3.14 for additional details. Potential impacts to water quality from equipment failure or mismanagement would only be anticipated if there are open bodies of water on or directly adjacent to future onshore facilities. Therefore, environmental justice populations in the GAA are expected to experience **negligible** adverse water quality impacts as a result of future offshore wind activities.

Air emissions: During construction of onshore facilities of future offshore wind energy projects, neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by project–related emissions and dust (see Section 3.14 and Section 3.4). State and local agencies would be responsible for managing actions to help minimize and avoid air quality impacts on nearby neighborhoods during construction. Therefore, the onshore activities associated with offshore wind energy construction are expected to have short-term **minor** to **moderate** adverse air quality impacts on the health and safety of environmental justice populations.

New cable emplacement/maintenance and presence of structures: As described in Section 3.10, activities associated with construction of the onshore components of future offshore wind energy projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. Although BOEM would be able to add terrestrial cultural resources identification requirements and mitigation measures for cables and structures associated with future offshore wind energy projects outside the current terrestrial APE, the potential for permanent, **minor** to **major** adverse impacts on buried cultural resources remains. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning are able to avoid these cultural resources.

Noise: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to onshore construction areas and mustering port(s) of reasonably foreseeable projects could temporarily be disturbed by project-related noise (see Section 3.14). Onshore construction noise would temporarily inconvenience visitors, workers, and residents near sites where onshore cables, onshore substations, or port improvements are installed to support offshore wind.

Impacts would depend on the location of onshore construction in relation to businesses or environmental justice communities. Impacts on environmental justice communities could be short term and intermittent, similar to other onshore utility construction activity. State and local agencies would be responsible for managing actions to help minimize and avoid noise impacts on nearby neighborhoods during construction. Noise generated by offshore wind energy project staging operations at ports could impact the health and safety of environmental justice populations if the port is located near such populations. The noise impacts from increased port utilization would be short term and variable, would be limited to the construction period, and would increase if a port is used for multiple offshore wind projects during the same time period. However, construction sounds specifically related to offshore wind energy project activities at port facilities are expected to be similar to operational sounds associated with routine

activities at these ports. In addition, noise impacts would be reduced if intervening buildings, roads, or topography lessen the intensity of noise in nearby residential neighborhoods, or if noise reduction mitigations are used for motorized vehicles and equipment. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse noise impacts on the health and safety of environmental justice populations.

Vehicular traffic: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to onshore construction areas and mustering port(s) of reasonably foreseeable projects could temporarily be disturbed by project–related vehicular traffic. See Section 3.14 for additional details. Environmental justice populations near onshore facilities could experience traffic impacts. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Environmental justice populations near ports used for construction staging could also experience traffic impacts. Project-related deliveries would result in trucks loading and unloading materials/equipment as well as vehicle movements to complete assembly, fabrication, and staging of project components and equipment. However, the projected traffic increase at ports is expected to be well within the daily fluctuation of ongoing port-related traffic. In addition, maintenance and protection of traffic setups may be implemented for offshore wind energy projects to minimize impacts to traffic. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse vehicular traffic impacts on the health and safety of environmental justice populations during project construction and decommissioning activities and long-term **negligible** adverse impacts during project operations.

3.12.1.2 Conclusions

As discussed in Section 3.11, construction and installation, O&M, and decommissioning of offshore wind energy projects would support new employment and economic activity in the manufacturing sector and marine construction and transportation sectors. Some members of environmental justice populations are expected to experience these employment and income benefits, but the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations residing in the GAA.

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on the health and safety of environmental justice populations associated with the Project would not occur.

Considering all the IPFs together, BOEM anticipates that the impacts to environmental justice populations associated with future offshore wind activities in the GAA would be short term during construction and long term during O&M, and **minor** to **major** adverse. These ratings primarily reflect economic and public health and safety impacts to environmental justice populations due to increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. Adverse impacts could be reduced or avoided with mitigation measures. In particular, the impact to Native American tribes due to future offshore wind activities in proximity to landforms and archaeological sites would change from long term **major** adverse to long term **negligible** to **minor** adverse if activities can avoid damage to these cultural resources. Long-term **negligible** to **moderate** beneficial effects to the

health and safety of environmental justice populations could result from reductions in air pollution and GHG emissions if offshore wind replaces the need for fossil fuel–combusting power generation.

BOEM anticipates that future offshore wind activities in the GAA, combined with ongoing activities and reasonably foreseeable activities other than offshore wind, would result in an overall long-term **major** adverse impact to environmental justice populations due to climate change and disturbance of landforms and archaeological sites of cultural significance to Native American tribes. The impact to Native American tribes due to ongoing and future activities potentially affecting landforms and archaeological sites would be long term **negligible** to **minor** adverse if activities can avoid damage to these cultural resources.

3.12.2 Environmental Consequences

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

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (see Appendix D) would influence the magnitude of the impacts on the economic welfare and health and safety of environmental justice populations:

- Overall size of the Project and number of WTGs constructed
- The Project layout including the type, height, and placement of the WTGs and OSS, and the design and visibility of lighting on the structures
- The port(s) selected to support construction, installation, and decommissioning and the port(s) selected to support O&M
- The time of year during which onshore and nearshore construction occurs

These Project design parameters would influence the magnitude of adverse impacts to environmental justice populations primarily through economic and public health and safety impacts associated with increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. However, EPMs implemented during construction, O&M, and decommissioning would decrease the potential for impacts to environmental justice populations (see Table F-1 in Appendix F). These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for environmental justice across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-11 in Appendix E1.

Table 3.12-4 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis

indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each action alternative analysis discussion includes rationale for the effects determinations. Under all of the active alternatives, the overall impact to environmental justice populations from any alternative would be **minor** to **moderate** adverse and **minor** beneficial as EPMs would reduce adverse impacts substantially during the life of the proposed Project, including decommissioning; the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or once the impacting agent is gone, the affected activity or community, including traditional cultural practices, is expected to return to a condition with no measurable impacts, when remedial or mitigating action is taken.

Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

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Table 3.12-4. Alternative Comparison Summary for Environmental Justice

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Onshore**: Offshore wind energy development would comply with all regulatory requirements for water quality protection. Therefore, environmental justice populations in the GAA are expected to experience **negligible** adverse impacts.	**Onshore**: EPMs implemented would avoid or reduce potential spill impacts on water quality. Moreover, there are no waterbodies in the path of the onshore transmission cable or on the OnSS or ICF parcels that could be contaminated by an accidental release and discharge resulting from equipment failure or mismanagement during construction. Therefore, impacts to the health and safety of environmental justice populations associated with changes in water quality would be short term **negligible** adverse. To the extent that decreases in water quality occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. However, onshore and offshore development, including the Proposed Action, would comply with all regulatory requirements for water quality protection. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term and **negligible** to **minor** adverse impacts.	**Onshore**: Construction, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts on the health and safety of environmental justice populations would be similar to the Proposed Action: short term and **negligible** to **minor** adverse.			
Air emissions	**Offshore**: During construction, impacts from future wind development activities on air quality would be temporary and **minor** to **moderate** and could result in short-term disproportionately high and adverse health and safety impacts to environmental justice populations, especially if multiple offshore wind projects simultaneously use the same port for construction staging. During operations, offshore wind energy projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. Therefore, the overall air quality impacts of offshore wind energy development on the health and safety of environmental justice populations would be **minor** to **moderate** beneficial.	**Offshore**: During Project construction, the air emissions near mustering ports would be temporary and **minor** adverse. Therefore, the air quality impacts on the health and safety of environmental justice populations near the ports would be short term **minor** adverse. During operations, the Projects would reduce the need for fossil fuel–combusting power generation, which would have a net beneficial impact on air quality. Therefore, the overall air quality impacts of the Project on the health and safety of environmental justice populations would be long term **minor** beneficial. Despite the potential for increased air emissions during construction of the Project and other new offshore wind energy projects, over the long term, the reduction in the need for fossil fuel–combusting power generation would have a net beneficial impact on air quality in the GAA. Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial impact.	**Offshore**: Under Alternatives C through F, the air emissions impact level due to a change in air pollutant emissions would be similar to the Proposed Action (see Section 3.4). Therefore, the air emissions impact to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse during construction and decommissioning and long term **minor** to **moderate** beneficial during operations.			
	Onshore: State and local agencies would be responsible for managing actions to help minimize and avoid air quality impacts of offshore wind energy projects on neighborhoods during onshore construction. Therefore, the onshore activities are expected to have short-term **minor** adverse impacts on the health and safety of environmental justice populations.	**Onshore**: The potential impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans. Therefore, impacts to the health and safety of environmental justice populations near the landing site and onshore transmission cable route associated with changes in air quality during Project construction would be short term **minor** adverse. Impacts to air quality from Project onshore facilities' O&M emissions would be **negligible** adverse. State and local agencies would be responsible for minimizing and avoiding air quality impacts of ongoing and future onshore activities on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, the overall cumulative air quality impacts on the health and safety of environmental justice populations is expected to be long term **minor** to **moderate** adverse.	**Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short-term **negligible** to **minor** adverse impacts on the health and safety of environmental justice populations near affected ports, short-term **minor** adverse impacts on the health and safety of environmental justice populations near the proposed landing sites and onshore transmission cable route, long-term **negligible** adverse impacts during Project O&M, and long-term **negligible** adverse impacts during decommissioning. Cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **minor** to **moderate** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Climate change	**Offshore**: Future offshore wind energy project GHG emissions during construction would be short term **negligible** adverse as compared to aggregate global emissions. During O&M, these projects would contribute to a broader combination of actions to reduce future impacts on the health and safety of environmental justice populations from climate change over the long term. However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from the Project would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations.	**Offshore**: Project GHG emissions during construction would be short term **negligible** adverse. During operations, the Project would contribute to a broader combination of actions to reduce future impacts on the health and safety of environmental justice populations from climate change over the long term. However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from offshore wind energy development would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations The Proposed Action, together with other future offshore wind energy projects, could beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term. However, the overall cumulative impact of climate change on the health and safety of environmental justice populations is expected to be long term **major** adverse.	**Offshore**: The climate change impact level of Alternatives C through F due to a change in GHG emissions would be similar to the Proposed Action (see Section 3.4). Therefore, the climate change impact to the health and safety of environmental justice populations would be similar to the Proposed Action: long term **negligible** beneficial. Likewise, the cumulative impacts of climate change on the health and safety of environmental justice populations would be similar to the Proposed Action: long term **major** adverse.			
Light	**Offshore**: Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with negligible to moderate adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term to long term **minor** to **moderate** adverse during construction and O&M. If ADLS (or a similar system) is installed on WTGs in offshore wind energy projects, impacts to environmental justice populations would be reduced to **negligible** to **minor** adverse. Lighting on WTGs could also affect cultural resources, including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on cultural resources but adverse impacts on Native American tribes would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy	**Offshore**: Visual impacts on recreation and tourism would be short term with **negligible** to **moderate** adverse impacts during construction, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **negligible** to **moderate** adverse during construction. Revolution Wind has committed to implement ADLS as a measure to reduce light impacts. Therefore, economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be long term **negligible** adverse during O&M. Lighting on WTGs could also affect cultural resources, including views of night sky and the ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. Because adverse lighting impacts on target are expected to be localized and temporary, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **negligible** to **minor** adverse. Cumulatively, aviation hazard lighting from the WTGs associated with the No Action Alternative and Proposed Action could be visible from coastal locations. The use of ADLS would reduce impacts to tourism, thereby reducing the economic impact of lighting on members of environmental justice populations employed in tourism-related service industries to long term **negligible** adverse. The Proposed Action when combined with ongoing and reasonably foreseeable activities could have adverse light impacts on viewshed resources important to Native American tribes. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy development, and the resolution of these adverse effects. The cumulative adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor** adverse.	**Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts of light on tourism-related service industries that are a source of employment for low-income workers would be reduced. In addition, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the light impact level for recreation and tourism would still be similar to the Proposed Action. Therefore, the economic impact of lighting to environmental justice populations would be short term **minor** to **moderate** adverse during construction and decommissioning and long term **negligible** adverse during operations. In addition, omission of certain WTG positions would reduce the adverse impacts of lighting to viewsheds important to Native American tribes. In particular, Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project lights to viewshed resources important to Native American tribes at Aquinnah. However, the impact on environmental justice populations under Alternatives C through F would be similar to the Proposed Action. The light impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in tourism-related service industries would be similar to the Proposed Action: long term **negligible** adverse. The cumulative impacts to Native American tribes from the combined lighting impacts of ongoing and planned actions on cultural resources would be similar to the Proposed Action. The cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to the Proposed Action: long term **negligible** to **minor** adverse.			

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	development, and the resolution of these adverse effects. Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor** adverse.					
New cable emplacement/ maintenance	**Offshore**: The cable emplacement impacts on submerged marine cultural resources from offshore wind energy development could have long-term adverse disproportionate impacts on Native American tribes that trace their ancestry to these resources. If an ancient, submerged landform is disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The impact on Native American tribes would be long term **negligible** to **minor** adverse if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources. The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed under the presence of structures IPF: long term **moderate** adverse.	**Offshore**: If submerged ancient landforms are disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse. Revolution Wind could conduct O&M activities on equipment in areas that previously experienced disturbance during construction, thereby reducing impacts to submerged marine cultural resources to long term but **negligible** adverse. Impacts during Project decommissioning would be similar to impacts during construction: long term **negligible** to **minor** adverse if Project decommissioning is able to avoid cultural resources. The economic impacts of new cable emplacement and maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF: short term **moderate** adverse during construction and decommissioning and long term **moderate** adverse during operations. The cable emplacement impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term **major** adverse disproportionate impacts on Native American tribes if these cultural resources are disturbed. If the Proposed Action, together with ongoing and reasonably foreseeable activities, are able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse. The cumulative adverse economic effects of new cable emplacement and maintenance to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate** adverse.	**Offshore**: If the length of IACs is reduced under Alternatives C through F, the adverse impacts of new cable emplacement and maintenance on submerged ancient landforms important to Native American tribes could be reduced. However, the new cable emplacement and maintenance impact level for cultural resources would still be similar to the Proposed Action: long term **negligible** to **minor** adverse if construction and decommissioning is able to avoid cultural resources; long term **major** adverse if construction and decommissioning disturb cultural resources. Impacts during Project O&M would be long term but **negligible** adverse. In addition, reducing the length of IACs would lessen adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations. However, the new cable emplacement and maintenance impact level for commercial fisheries and for-hire recreational fishing would still be similar to the Proposed Action: short term **moderate** adverse for construction and decommissioning and long term **moderate** adverse during operations. The impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term **moderate** adverse. The cumulative impacts to Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term **major** adverse if these cultural resources are disturbed, and long term **negligible** to **minor** adverse if disturbance of these cultural resources is avoided.			
	Onshore: Activities associated with construction of the onshore components of future offshore wind energy projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If	**Onshore**: Activities associated with construction of the onshore components of the Project, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.	**Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts on environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction is unable to avoid cultural resources, and long term and **negligible** to **minor** adverse if construction is able to avoid cultural resources. Likewise; cumulative impacts to environmental justice populations would be similar to the Proposed Action: long term **major** adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long			

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	archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning are able to avoid these cultural resources.	The construction of the onshore Project components would result in modification to the existing viewshed because the OnSS and ICF infrastructure could be visible. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction of the Proposed Action and reasonably foreseeable projects, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If construction of the Proposed Action and reasonably foreseeable projects is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.	term **negligible** to **minor** adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources.			
Noise	**Offshore**: Underwater noise from construction, O&M, and decommissioning activities related to offshore wind energy development could result in decreasing the catchability of some target species. Given that target species are expected to return to an area after the noise ends, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor** adverse. Future offshore wind energy projects are expected to have a long-term **negligible** to **minor** adverse impact on the recreational and subsistence fishing activities of environmental justice populations.	**Offshore**: Underwater noise from construction activities related to the Project could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catchability of some target species. Given that target species are expected to return to an area after the noise ends, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor a**dverse. Noise generated by offshore activities during Project construction is expected to have a short-term **negligible** to **minor** adverse impact on the recreational and subsistence fishing activities of environmental justice populations. The adverse economic effects of noise from ongoing and future offshore activities, including the Proposed Action, to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term and **negligible** to **minor** and long term **negligible** to **minor**.	**Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the noise impact level for commercial fisheries, for-hire recreational fishing, and recreational fishing would still be similar to the Proposed Action: **negligible** to **minor a**dverse. Cumulatively, the impact to members of environmental justice populations employed in commercial and for-hire recreational fisheries or participating in recreational and subsistence fisheries would also be similar to that for the Proposed Action: short term to long term **negligible** to **minor** adverse.			
	Onshore: Environmental justice populations near onshore facilities or ports used for construction staging could experience noise impacts. State and local agencies would be responsible for managing actions to help minimize and avoid noise impacts on nearby neighborhoods during construction. Therefore, offshore wind energy construction is expected to have short-term **minor** adverse noise impacts on environmental justice populations.	**Onshore**: Environmental justice populations near ports supporting Project construction or near the proposed landing site and onshore transmission cable route could experience noise impacts. Noise impacts to environmental justice populations near ports would be short term **negligible** to **minor** adverse and impacts during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** adverse. impacts to land uses from Project onshore facilities' O&M noise would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to environmental justice populations would be long-term **negligible** adverse during Project O&M, and short term **negligible** to **minor** adverse during decommissioning. The Proposed Action could increase exposure to noise pollution by environmental justice populations beyond conditions under the No Action Alternative. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** adverse noise impacts on environmental justice populations.	**Onshore**: Construction and installation, O&M, and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short-term to long-term **negligible** to **minor** adverse impacts on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route. Likewise, cumulative impacts to environmental justice populations would be similar to the Proposed Action: short term **minor** adverse.			

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Presence of structures	**Offshore**: To the extent that the impacts of offshore structures associated with future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice population engaged in these fisheries could be disproportionately adversely affected. However, if measures that mitigate adverse impacts to commercial and for-hire recreational fisheries are implemented, economic impacts to environmental justice populations engaged in these fisheries would be long term **minor** to **moderate** adverse. Offshore construction of WTG and OSS foundations could damage submerged ancient landforms that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If an ancient submerged landform is disturbed during offshore construction, the impact on the cultural resource would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. The adverse impact on Native American tribes would be long term **negligible** to **minor** if offshore wind energy project construction and installation, O&M, and decommissioning can avoid these cultural resources. The construction and presence of the offshore components could also result in modification to the existing viewshed during the daytime because a range of WTG structures would be visible on the horizon. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified	**Offshore**: To the extent that the impacts of offshore structures associated the Proposed Action result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice population engaged in these fisheries could be disproportionately adversely affected. However, adverse impacts to commercial and for-hire recreational fisheries would be avoided with EPMs. Therefore, the Proposed Action when combined with ongoing and reasonably foreseeable activities would result in long-term **moderate** adverse impacts to members of environmental justice populations employed in commercial fisheries and for-hire recreational fishing. Members of environmental justice populations for whom subsistence fisheries are an important food source are not expected to lose access to fishing areas on the shoreline or close to shore during construction of the offshore RWEC and the Project's offshore components. Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are considered long term but **negligible** adverse. Impacts to these individuals during Project O&M would be long term but **negligible** to **minor** adverse. Potential impacts from reduced subsistence fishing opportunities caused by dredging are expected to be long term but **negligible** adverse during Project O&M. The construction and presence of the offshore Project components would result in modification to the existing viewshed during the daytime because a range of RWF WTG structures would be visible on the horizon. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to adversely affect environmental justice populations. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. The presence of structures impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term **major** adverse disproportionate impacts on Native American tribes if these cultural resources are disturbed. If the Proposed Action, together with ongoing and reasonably foreseeable activities, are able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse. The cumulative economic impact to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing resulting from the presence of structures would be long term **moderate** adverse.	**Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the presence of structures impact level would be similar to the Proposed Action: short-term to long term **minor** to **moderate** adverse. In addition, the omission of certain WTG positions would reduce impacts to submerged ancient landforms important to Native American tribes. However, the presence of structures impact level would be similar to the Proposed Action: long term **negligible** to **minor** adverse if construction and decommissioning is able to avoid cultural resources; long term **major** adverse if construction and decommissioning is unable to avoid cultural resources. Under Alternatives C through F, fewer WTG structures would be visible on the horizon from various shoreside historic properties of importance to Native American tribes. In particular, Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project WTG structures to viewshed resources important to Native American tribes at Aquinnah. However, the impact on environmental justice populations under Alternatives C through F would be similar to the Proposed Action. The presence of structures impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial and for-hire recreational fisheries would be similar to the Proposed Action: long term **moderate** adverse. The cumulative impacts on Native American tribes that trace their ancestry to submerged marine cultural resources would be similar to the Proposed Action: long term **major** adverse if construction of the Proposed Action and reasonably foreseeable projects are unable to avoid cultural resources, and long term **negligible** to **minor** adverse if construction of the Proposed Action and reasonably foreseeable projects are able to avoid cultural resources.			

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	historic properties, the adverse effects, and the resolution of adverse effects.					
Vessel traffic	**Offshore**: Vessel traffic from construction, O&M, and decommissioning activities related to offshore wind energy development could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA. Given that the potential for vessel congestion and gear conflict is expected to be long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be long term and **minor** to **moderate**.	**Offshore**: Vessel traffic from offshore activities related to Project construction, O&M, and decommissioning activities could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA. Given that the potential for vessel congestion and gear conflict is expected to be long term, the economic effects to members of environmental justice populations engaged in commercial fisheries would be long term and **minor** to **moderate** adverse**.** Vessel traffic from ongoing and future offshore activities, including the Proposed Action, is expected to continue. Therefore, the cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries would be long term and **minor** to **moderate** adverse.	**Offshore**: If certain WTG positions are omitted under Alternatives C through F, the adverse impacts on commercial and for-hire recreational fisheries that provide employment for some members of environmental justice populations would be reduced. However, the vessel traffic impact level would still be similar to the Proposed Action: long term **minor** to **moderate** adverse. The vessel traffic impact of Alternatives C through F would not be markedly different from the Proposed Action. Therefore, the cumulative economic impacts on members of environmental justice populations employed in commercial fisheries would be similar to the Proposed Action: long term **minor** to **moderate** adverse.			
Vehicular traffic	**Onshore**: During construction of onshore facilities of future offshore wind energy development projects, neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by project–related vehicular traffic. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Therefore, environmental justice populations near onshore facilities or ports used for construction staging are expected to experience short-term **minor** adverse impacts during project construction and decommissioning activities and long-term **negligible** adverse impacts during project operations.	**Onshore**: Environmental justice populations near ports supporting Project construction or the proposed landing site and onshore transmission cable route could experience traffic impacts. Access to neighborhoods would be maintained, and activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities and would not hinder other nearby land use. Therefore, impacts to environmental justice populations associated with vehicular traffic at ports during Project construction and decommissioning would be short term and **minor** adverse. Construction of onshore facilities would temporarily disturb neighboring land uses through intermittent delays in travel along affected roads. State and local agencies would be responsible for managing actions to help minimize and avoid vehicular traffic impacts on nearby neighborhoods during construction. Therefore, impacts to the health and safety of environmental justice populations associated with vehicular traffic during Project construction and decommissioning activities at the proposed landing site and along the onshore transmission cable route would also be short term **minor** adverse. Traffic impacts to the health and safety of environmental justice populations near onshore facilities or ports used for construction staging during Project O&M would be **negligible** adverse. Traffic impacts to the health and safety of environmental justice populations associated with the Project, when combined with the impacts of past, present, and reasonably foreseeable future activities, would be short term **minor** adverse.	**Onshore**: Construction and installation and decommissioning of onshore facilities under Alternatives C through F would not be markedly different from the Proposed Action; therefore, impacts would be similar to the Proposed Action: short-term and **minor** adverse impacts on environmental justice populations near affected ports and near the proposed landing sites and onshore transmission cable route. O&M of onshore facilities under Alternatives C through F would be long term **negligible** adverse. Likewise, cumulative impacts to the health and safety of environmental justice populations would be similar to the Proposed Action: short term **minor** adverse.			

3.12.2.2 Alternative B: Impacts of the Proposed Action on Environmental Justice

As discussed in Section 3.11, construction and installation, O&M, and decommissioning of the Proposed Action and all action alternatives considered in this EIS would support new employment and economic activity in the manufacturing sector and marine construction and transportation sectors. Some members of environmental justice populations are expected to experience these employment and income benefits, but the benefits would be no greater for environmental justice populations than those experienced by non-environmental justice populations residing in the GAA.

In addition to supporting the employment described above, BOEM expects construction and installation, O&M, and decommissioning of the Project to affect environmental justice populations through the IPFs listed in the following section.

3.12.2.2.1 Construction and Installation

Offshore Activities and Facilities

Air emissions: As described in Section 3.4, during construction, Project air emissions from vessels, helicopters, generators, and fuel-burning equipment could have temporary, direct impacts on New London, Gloucester, Baltimore, Providence, Washington, Bristol, and Norfolk City Counties' air quality. However, potential emissions would be reduced by implementing proposed EPMs (see Table F-1 in Appendix F). Moreover, if the Project cannot demonstrate compliance with the NAAQS, a permit would not be issued and the Project would not proceed. Therefore, the adverse impacts to air quality near populated areas in the GAA during construction are expected to be short term **minor**, and the adverse impacts on the health and safety of environmental justice populations near mustering ports are expected to be short term **minor** (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports).

Light: The Proposed Action would require nighttime construction vessel lighting similar to what is described in the No Action Alternative (see Section 3.12.1.1). To the extent that offshore lighting during Project construction has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected because service industries that support tourism are a source of employment for low-income workers. Visual impacts on recreation and tourism would be short term with **negligible** to **moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed (see Section 3.18). Therefore, adverse economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be short term **minor** to **moderate**.

Light from offshore activities related to Project construction could affect cultural resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, this lighting has the potential to disproportionately adversely affect environmental justice populations. Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F). As a result, the adverse impacts of light from offshore activities on views important to Native American tribes would be reduced but not eliminated. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

The adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing during construction of the Project would be the same as described in the No Action Alternative (see Section 3.12.1.1): short term and **negligible** to **minor**.

New cable emplacement/maintenance: Offshore cable emplacement during Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1) and could damage submerged ancient landforms. If these landforms are disturbed during construction of the Proposed Action, a long-term **moderate** to **major** adverse impact on the affected Native American tribes would result. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.

As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during construction of the RWEC and IAC. The economic impacts of new cable emplacement to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement and maintenance impact level would be the same as the presence of structures impact level: short term **minor** to **moderate** adverse.

Noise: Underwater noise impacts associated with construction of the Proposed Action would be the same as those described in the No Action Alternative (see Section 3.12.1.1): short term and **negligible** to **minor** adverse.

The localized adverse noise impacts of offshore Project construction activities would be as described in Section 3.12.1.1. Consequently, noise generated by offshore activities during Project construction is expected to have a short-term **negligible** to **minor** adverse impact on the recreational and subsistence fishing activities of environmental justice populations.

Presence of structures: As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project construction as a result of the installation of WTGs and OSSs. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. However, Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind 2020) (see Table F-1 in Appendix F), together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction activities, would help ensure that fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, the adverse economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **moderate** during Project construction.

Members of environmental justice populations for whom subsistence fisheries are an important food source are not expected to lose access to fishing areas on the shoreline or close to shore during Project construction. As described in Section 3.18, construction staging areas would be located such that public parking, beach access, and access to campsites would be maintained. Additionally, Revolution Wind

would inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements (see Table F-1 in Appendix F). If the O&M facility is located in the Port of Montauk, initial construction dredging would occur under a separate offshore wind energy project (the SFWF Project), and only within a previously dredged footprint (Roll 2021). The impact of this dredging on invertebrate and fish populations would be **negligible** adverse (see Section 3.6.2 and Section 3.13). Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are considered long term **negligible** adverse.

The construction of the offshore Project components would result in modification to the existing viewshed during the daytime because a range of RWF WTG structures would be visible on the horizon (see Section 3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views of the ocean from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to disproportionately adversely affect environmental justice populations. The visual impacts of the RWF WTGs would be moderated by their consistent structural appearances and color (see Section 3.10). BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Vessel traffic: Vessel traffic from Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1), and given that the potential for vessel congestion and gear conflict is expected to be short term (see Section 3.9), the adverse economic effects to members of environmental justice populations engaged in commercial fisheries would be short term and **minor** to **moderate**.

Onshore Activities and Facilities

Accidental releases and discharges: Potential fuel or oil spills could occur during Project construction in or near concentrations of environmental justice populations. However, Table F-1 in Appendix F includes EPMs to avoid or reduce potential spill impacts on water quality. Moreover, there are no waterbodies in the path of the onshore transmission cable or on the OnSS or ICF parcels that could be contaminated by an accidental release and discharge resulting from equipment failure or mismanagement during construction (see Section 3.21). Therefore, impacts to the health and safety of environmental justice populations associated with changes in water quality during Project construction would be short term **negligible** adverse.

Air emissions: Environmental justice populations near the proposed landing sites and onshore transmission cable route could experience air quality impacts. Construction of the chosen landing site and onshore transmission cable route would temporarily disturb neighboring land uses through temporary increases in construction dust and emissions from heavy equipment performing clearing, grading, excavation, the installation of foundations, and heavy lifting of substation components. As described in Section 3.12.1, the block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Environmental justice and non-environmental justice populations would equally experience any adverse air emission impacts. The potential impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans (see Section 3.14). Therefore, impacts to the health and safety of environmental justice

populations near the landing site and onshore transmission cable route associated with changes in air quality during Project construction would be short term **minor** adverse.

New cable emplacement/maintenance and presence of structures: Onshore cable emplacement during Project construction would be the same as described in the No Action Alternative (see Section 3.12.1.1) and could physically disturb archaeological sites. If archaeological sites that have cultural significance to tribes are disturbed during construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse impact on the affected Native American tribes. If Project construction is able to avoid these cultural resources, the impact on Native American tribes would be long term **negligible** to **minor** adverse.

The construction of the onshore Project components would result in modification to the existing viewshed because the OnSS and ICF infrastructure could be visible (see Section 3.20). The presence of these structures could affect cultural resources (see Section 3.10), including views from various shoreside historic properties of importance to Native American tribes. Given the cultural significance of viewshed resources to Native American tribes, the visibility of these structures has the potential to disproportionately adversely affect environmental justice populations. However, the OnSS and ICF infrastructure would largely blend with the existing Quonset Point Naval Air Station, and the presence of existing intervening residential development and landscape vegetation along roadways and other viewing locations would further reduce the extent of visual impacts (see Section 3.10 and Section 3.20). BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Noise: Environmental justice populations near mustering ports that support Project construction could experience noise impacts (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports). However, the ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors. Noise levels are not expected to exceed ambient noise conditions generated by ongoing port activities (see Section 3.14). Therefore, noise impacts to the health and safety of environmental justice populations near ports would be short term **negligible** to **minor** adverse.

Environmental justice populations near the proposed landing site and onshore transmission cable route could also experience noise impacts. The landfall work area at Quonset Point in North Kingstown, Rhode Island, has been developed for industrial use, and the noise from Project construction would not be out of context with a working industrial park (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Environmental justice and non-environmental justice populations would equally experience any adverse noise impacts. Noise generated by Project construction and installation activities is expected to comply with the Town of North Kingstown noise code (see Section 3.14). Additionally, the onshore construction schedule would be designed to minimize impacts to the local community during the summer tourist season (see Table F-1 in Appendix F), thereby reducing the economic impact on members of environmental justice populations employed in service industries that support tourism. Therefore, impacts to the health and safety of environmental justice populations associated with noise during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** adverse.

Vehicular traffic: Environmental justice populations near mustering ports that support Project construction could experience traffic impacts (Figures G-28 through G-33 in Appendix G show potential environmental justice areas of concern near ports). Environmental justice and non-environmental justice populations would equally experience these impacts. Access to neighborhoods would be maintained, and activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities and would not hinder other nearby land use (see Section 3.14). Moreover, maintenance and protection of traffic setups would be implemented to minimize impacts to traffic during Project construction (vhb 2022). Therefore, adverse impacts to the health and safety of environmental justice populations associated with vehicular traffic at ports during Project construction would be short term **minor**.

Environmental justice populations near the proposed landing site and onshore transmission cable route could also experience traffic impacts. Construction of these onshore facilities would temporarily disturb neighboring land uses through intermittent delays in travel along affected roads (see Section 3.14). The block group in which most of the closest residences to the proposed onshore Project infrastructure are located is not a potential environmental justice area of concern based on either minority or low-income population criteria. Environmental justice and non-environmental justice populations would equally experience any adverse traffic impacts. Revolution Wind would abide by local construction ordinances and would work with the Town of North Kingstown to develop a detailed plan that includes traffic and other control measures prior to beginning major construction. The traffic plan with North Kingstown would identify appropriate alternative routes that would accommodate projected traffic loading during construction activities (see Section 3.14). Additionally, the onshore construction schedule would be designed to minimize traffic impacts to the local community during the summer tourist season (see Table F-1 in Appendix F), thereby reducing the economic impact on members of environmental justice populations employed in service industries that support tourism. Therefore, impacts to the health and safety of environmental justice populations associated with vehicular traffic during Project construction activities at the proposed landing site and along the onshore transmission cable route would be short term **minor** to **moderate** adverse.

3.12.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Air emissions: During operations, the Project would have an overall long-term **minor** beneficial health impact on populations in the GAA, including environmental justice populations, by avoiding a portion of the air pollutant emissions generated by fossil fuel–combusting energy facilities (see Section 3.4). Given that environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, the beneficial health impacts of reducing air pollution that accrue to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. Impacts during Project decommissioning would be similar to impacts during construction: short term **minor** adverse. There would be no further impacts once decommissioning is complete.

Climate change: Given that environmental justice populations could be particularly vulnerable to the adverse impacts of climate change because of where they live, language barriers, their health, and their limited financial resources to cope with these effects, the beneficial impacts of reducing GHG emissions

that accrue to these populations could be greater than those experienced by non-environmental justice populations who also reside in the affected area. During operations, the Project would contribute to a broader combination of actions to reduce future impacts from climate change over the long term (see Section 3.4). However, given the global scale of GHG emissions, the reduction in GHG emissions resulting from the Project would have a long-term **negligible** beneficial impact on the health and safety of environmental justice populations.

Light: The view of nighttime aviation warning lighting required for O&M of offshore Project facilities is the same as described in the No Action Alternative (see Section 3.12.1.1). However, Revolution Wind has committed to implement ADLS as a measure to reduce light impacts (see Table F-1 in Appendix F), and visual impacts on recreation and tourism during O&M, while long term, are expected to be **negligible** adverse (see Section 3.18). Therefore, adverse economic impacts to members of environmental justice populations employed in tourism-related service industries are expected to be long term **negligible** adverse. Impacts during Project decommissioning would be similar to impacts during construction: short term **minor** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

Lighting on WTGs could also affect cultural resources (see Section 3.10) during O&M, including views of the night sky and the ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting, but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects. Impacts during Project decommissioning would be similar to impacts during construction. There would be no further impacts once decommissioning is complete.

Light from O&M activities related to the Project could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catchability of some target species as described in the No Action Alternative (see Section 3.12.1.1). Given that adverse lighting impacts on target species' catch in commercial and for-hire recreational fisheries are expected to be localized and long term, the adverse economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **negligible** to **minor**. Impacts during Project decommissioning would be similar to impacts during construction: short term **negligible** to **minor** adverse. There would be no further impacts once decommissioning is complete.

New cable emplacement/maintenance: As described in Section 3.10, Project O&M activities in the Lease Area and along the offshore RWEC could impact unknown submerged marine cultural resources of importance to Native American tribes. However, Revolution Wind could conduct O&M activities on equipment in areas that previously experienced disturbance during construction, thereby reducing impacts to submerged marine cultural resources to long term **negligible** adverse. Therefore, adverse impacts to Native American tribes due to potential disturbance of these cultural resources are expected to be long term **negligible**. Impacts during Project decommissioning would be similar to impacts during construction: long term **negligible** to **minor** adverse if Project decommissioning is able to avoid these cultural resources. There would be no further impacts once decommissioning is complete.

As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during maintenance of the RWEC and IAC. The adverse impacts of cable maintenance to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to those discussed below under the presence of

structures IPF. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses (see Section 3.9). Therefore, the new cable emplacement/maintenance impact level would be the same as the presence of structures impact level: long term **moderate** adverse. Impacts during Project decommissioning would be similar to impacts during construction: short term **moderate** adverse. There would be no further impacts once decommissioning is complete.

Presence of structures: As noted in Section 3.9, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project O&M as a result of the presence of WTGs and OSSs. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, could be more vulnerable to job or income losses should Project O&M disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income populations. However, Revolution Wind's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear (Orsted U.S. Offshore Wind 2020), together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with operation activities, would help ensure that fishing businesses could continue to operate with minimal disruption (see Section 3.9). Therefore, the adverse economic impacts to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be long term **moderate** during Project O&M. Impacts during Project decommissioning would be similar to impacts during construction: short term **moderate** adverse. There would be no further impacts once decommissioning is complete.

As described in Section 3.12.1.1, members of environmental justice populations for whom subsistence fisheries are an important food source generally fish close to shore and are not likely to travel and fish within the Lease Area. Therefore, impacts to these individuals during Project O&M would be long term **negligible** to **minor** adverse. If the O&M facility is located in the Port of Montauk, then maintenance dredging would occur, but only within a previously dredged footprint. The impact of this dredging on invertebrate and fish populations would be long term **negligible** adverse (see Section 3.6 and Section 3.13). Therefore, potential impacts to environmental justice populations from reduced subsistence fishing opportunities caused by dredging are expected to be long term **negligible** adverse.

As discussed above, during the daytime, the range of RWF WTG structures would be visible on the horizon from various shoreside historic properties of importance to Native American tribes. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects, and the resolution of adverse effects.

Vessel traffic: Vessel traffic from offshore activities related to Project O&M could result in revenue reductions for commercial fishing businesses that operate in the areas offshore from the GAA (see Section 3.9). To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial fisheries and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. As described in Section 3.12.1, these fisheries are a source of employment and income for minority and/or low-income workers. Given that the potential for vessel congestion and gear conflict is expected to be long term, the economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse. Impacts during Project decommissioning would be similar to impacts during

construction: short term **minor** to **moderate** adverse. There would be no further impacts once decommissioning is complete.

Onshore Activities and Facilities

Accidental releases and discharges: As described in Section 3.21, Project O&M and decommissioning would include the same permit requirements and controls as described for construction activities and would lead to the same **negligible** adverse impacts to water quality. Therefore, adverse water quality impacts to the health and safety of environmental justice populations would be short term **negligible** adverse during Project O&M and short term **negligible** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Air emissions: As described in Section 3.4, impacts to air quality from Project onshore facilities' O&M emissions would be **negligible** to **minor** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** to **minor** adverse during Project O&M and short term **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Noise: As described in Section 3.14, impacts to land uses from Project onshore facilities' O&M noise would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** adverse during Project O&M and short term **negligible** to **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

Vehicular traffic: As described in Section 3.14, traffic impacts to land uses during Project O&M would be **negligible** adverse. Impacts during decommissioning would be similar to the impacts during construction and installation. Therefore, impacts to the health and safety of environmental justice populations would be long term **negligible** adverse during Project O&M and short term **minor** adverse during decommissioning. There would be no further impacts once decommissioning is complete.

3.12.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Air emissions: Despite the potential for increased air emissions during construction of the Project and other new offshore wind energy projects, over the long term the reduction in the need for fossil fuel–combusting power generation would have a net beneficial impact on air quality in the GAA (see Section 3.4). Members of environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful health effects of exposure to environmental pollution, including the fine particulate matter air pollution from fossil fuel–combusting power plants). Therefore, the air quality improvements from offshore wind energy development would have a long-term **minor** to **moderate** beneficial cumulative impact on the health and safety of environmental justice populations.

Climate change: The frequency and intensity of climate-related events such as heat waves and heavy flooding are becoming more frequent and more intense across most land regions, and this trend is

expected to continue (IPCC 2021). Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change–related events such as heat waves, heavy flooding, and droughts include where they live, language barriers, their health, and their limited financial resources to cope with these effects. Therefore, the adverse impacts to the health and safety of environmental justice populations of GHG emissions from ongoing and future offshore activities and facilities could be greater than those experienced by non-environmental justice populations who also reside in the affected area. The Proposed Action, together with other future offshore wind energy projects, could beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term. However, given the global scale of GHG emissions, environmental justice populations in the affected area are expected to experience adverse cumulative impacts from climate change that are **long term major**.

Light: Aviation hazard lighting from 1,036 WTGs associated with the No Action Alternative and Proposed Action within the recreation and tourism GAA could be visible from coastal locations. The view of this lighting could have localized impacts on economic activity by affecting the decisions of tourists or visitors in selecting coastal locations to visit (see Section 3.18). To the extent that the lighting has an adverse economic impact on tourism, environmental justice populations could be disproportionately affected because service industries that support tourism are a source of employment for low-income workers. The use of ADLS would reduce impacts to tourism, thereby reducing the cumulative economic impact of lighting to environmental justice populations to long term **negligible** adverse.

Cumulatively, the Proposed Action when combined with ongoing and reasonably foreseeable activities could have adverse impacts on viewshed resources (see Section 3.10), including views of the night sky and ocean that are important to Native American tribes. ADLS would reduce the impacts on Native American tribes associated with WTG lighting but adverse impacts would continue. BOEM remains in consultation with Native American tribes and NHPA Section 106 consulting parties regarding identified historic properties, the adverse effects of offshore wind energy development, and the resolution of these adverse effects.

Ongoing and future offshore activities, including the Proposed Action, that introduce artificial lighting could result in revenue reductions for commercial fishing and for-hire recreational fishing businesses by decreasing the catchability of some target species. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. Given that adverse lighting impacts on target species catch in commercial and for-hire recreational fisheries are expected to be localized and short term (see Section 3.9), the cumulative economic impacts to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **negligible** to **minor** adverse.

New cable emplacement/maintenance: The cable emplacement impacts on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have disproportionate adverse impacts on Native American tribes that trace their ancestry to these resources. The Project and other proposed offshore wind energy projects are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. However, ancient submerged landforms could extend beyond the maximum work area or Lease Area for an undertaking; for this reason, it may not be

practicable to avoid these features through Project redesign. Disturbance and destruction of even a portion of an identified submerged landform could degrade or eliminate the value of the resource as a potential repository of archaeological knowledge and cultural significance to tribes. Therefore, the Proposed Action when combined with ongoing and reasonably foreseeable activities could result in long-term **major** adverse cumulative impacts to affected Native American tribes.

To the extent that Project impacts, together with the impacts of ongoing and other future offshore activities, result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected. Certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.12.1, many of these workers are members of minority and/or low-income groups. However, financial compensation policies implemented by offshore wind developers, together with the ability of some fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and installation, O&M, and decommissioning activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, the Proposed Action when combined with ongoing and reasonably foreseeable activities would result in long-term **moderate** adverse cumulative impacts to members of environmental justice populations employed in commercial fisheries and for-hire recreational fishing.

Noise: Ongoing and future offshore activities, including the Proposed Action, that increase underwater noise could result in revenue reductions for commercial fishing and marine recreational businesses by decreasing the catchability of some target species. As described in Section 3.12.1, these businesses are a source of employment and income for minority and/or low-income workers. Given that target species are expected to return to an area after the noise ends, the cumulative economic effects to members of environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be short term **negligible** to **minor** adverse.

The localized adverse noise impacts of ongoing and future offshore activities on fishing could affect low-income residents who substantially rely on recreational fisheries as a food source. Similarly, offshore noise could have adverse impacts on the subsistence fisheries of Native American tribes in the GAA. However, as described in Section 3.12.1.1, local recreational and subsistence fisheries occur predominately in inshore areas. Consequently, ongoing and future offshore activities are expected to have a long-term **negligible** to **minor** adverse cumulative impact on the recreational and subsistence fishing activities of environmental justice populations

Presence of structures: The cumulative economic impacts of offshore structures to environmental justice populations engaged in commercial fisheries and for-hire recreational fishing would be similar to the cumulative impacts of new cable emplacement and maintenance. The potential impacts of both IPFs include loss of employment or income due to disruption to commercial fishing or for-hire recreational fishing businesses. Therefore, the cumulative presence of structures impact level would be the same as the cumulative new cable emplacement and maintenance impact level: long term **moderate** adverse.

The cumulative impacts of the construction of offshore structures on submerged marine cultural resources from ongoing and future offshore activities, including the Project, could have long-term **major**

disproportionate adverse impacts on Native American tribes that trace their ancestry to these resources. The Project and other proposed wind energy projects are expected to implement plans to avoid and minimize impacts on submerged marine cultural resources. However, ancient submerged landforms could extend well beyond the maximum work area or lease block for an undertaking; for this reason, it may not be practicable to avoid these features through Project redesign.

Vessel traffic: Vessel traffic from ongoing and future offshore activities, including the Proposed Action, is expected to continue. Given that the potential for vessel congestion and gear conflict is expected to be long term, the cumulative economic effects to members of environmental justice populations engaged in commercial fisheries would be long term **minor** to **moderate** adverse.

Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action is not expected to increase adverse water quality impacts on the health and safety of environmental justice populations beyond conditions under the No Action Alternative. See Section 3.21 and Section 3.14 for additional details regarding water quality impacts. To the extent that decreases in water quality occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. However, it is expected that onshore and offshore development, including the Proposed Action, would comply with all regulatory requirements for water quality protection. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short term **negligible** to **minor** cumulative adverse water quality impacts on the health and safety of environmental justice populations.

Air emissions: While air emissions in the region would increase temporarily during construction of offshore wind energy projects, including the Proposed Action, the operation of these projects could contribute to a long-term cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source (see Section 3.4). Therefore, past, present, and other reasonably foreseeable projects are expected to have long-term **minor** to **moderate** beneficial impacts on the health and safety of environmental justice populations.

New cable emplacement/maintenance and presence of structures: As described in Section 3.10, activities associated with construction of the onshore components of the Proposed Action and reasonably foreseeable projects, such as emplacement of onshore cables and new building construction, could physically disturb archaeological sites that have cultural significance to Native American tribes in the GAA as part of ancient and ongoing tribal practices. If archaeological sites that have cultural significance to tribes are disturbed during onshore construction, the impact on these cultural resources would be permanent, resulting in a long-term **major** adverse cumulative impact on the affected Native American tribes. If construction of the Proposed Action and reasonably foreseeable projects is able to avoid these cultural resources, the cumulative impact on Native American tribes would be long term **negligible** to **minor** adverse.

Noise: The Proposed Action could increase exposure to noise pollution by environmental justice populations beyond conditions under the No Action Alternative. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete (see Section 3.14). To the extent that increases in noise pollution occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. State and

local agencies would be responsible for minimizing and avoiding noise and air quality impacts on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** adverse cumulative noise impacts on the health and safety of environmental justice populations.

Vehicular traffic: The Proposed Action could result in intermittent delays in travel along impacted roads during the construction and installation phase. This would be a noticeable but minor adverse incremental impact and would cease when construction is complete (see Section 3.14). To the extent that increases in vehicular traffic occur as a result of ongoing and future onshore activities, environmental justice populations could experience adverse environmental and health effects. State and local agencies would be responsible for minimizing and avoiding traffic impacts on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside. Therefore, cumulative traffic impacts to environmental justice populations associated with the Project, when combined with the impacts of past, present, and reasonably foreseeable future activities, would be short term **minor** adverse.

3.12.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would have short-term to long-term adverse impacts on environmental justice populations, primarily through economic and public health and safety impacts associated with increases in air emissions, noise, and traffic; decreases in water quality; job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; adverse impacts to subsistence fishing activities; visual impacts on resources culturally important to Native American tribes; and damage to submerged ancient landforms that have cultural significance to Native American tribes. BOEM expects the overall level of impacts to environmental justice populations from the Proposed Action alone due to these factors to be **minor** to **moderate** adverse, as impacts could be reduced or avoided with EPMs. In addition, long-term beneficial effects to the health and safety of environmental justice populations could result from reductions in air pollution and GHG emissions to the extent that the Project replaces the need for fossil fuel–combusting power generation.

Considering all the IPFs together, BOEM anticipates that the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall long-term **major** adverse impact to environmental justice populations due to climate change and disturbance of landforms and archaeological sites of cultural significance to Native American tribes. The impact to Native American tribes due to ongoing and future activities potentially affecting landforms and archaeological sites would be long term **negligible** to **moderate** adverse if activities can avoid damage to these cultural resources.

3.12.2.3 Alternatives C, D, E, and F

Table 3.12-4 provides a summary of IPF findings for these alternatives.

3.12.2.3.1 Conclusions

If some WTGs are omitted under Alternatives C through F, a number of adverse impacts would be diminished relative to the Proposed Action. In particular, there would be a reduction in job and income losses due to the disruption of commercial fisheries, for-hire recreational fishing, or the tourism industry; a reduction in visual impacts on resources culturally important to Native American tribes; and a reduction in damage to submerged ancient landforms that have cultural significance to Native American tribes.

However, BOEM expects the overall level of impact to environmental justice populations resulting from each alternative alone would be similar to that of the Proposed Action: long term **minor** to **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's incremental impacts to environmental justice populations would be similar to the Proposed Action. Therefore, the overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term **major** adverse due to climate change and disturbance of landforms and of archaeological sites of cultural significance to Native American tribes.

3.12.2.4 Mitigation

Additional mitigation measures identified by BOEM with the potential to reduce impacts to environmental justice populations are provided in Table F-2 in Appendix F. Table F-2 also lists potential additional mitigation measures that could affect environmental justice populations in the areas of benthic habitat and invertebrates, finfish and EFH, commercial and for-hire recreational fishing, cultural resources, marine mammals, navigation and vessel traffic, and recreation and tourism.

3.13 Finfish and Essential Fish Habitat

3.13.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Finfish and Essential Fish Habitat

3.13.1.1 Finfish

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

The finfish GAA encompasses the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, which captures most of the movement range within U.S. waters for most species in this group. Since the finfish GAA encompasses the Gulf of Maine down to Cape Hatteras, North Carolina, for the purposes of Project-specific analysis, the focus is on finfish that would be likely to have regular or common occurrences in the RWF and RWEC and could be impacted by Project activities (Figure 3.13-1). The finfish GAA encompasses the extent of potential effects on finfish and their habitats. Thus, while Project-related impacts to finfish habitat are restricted to a relatively small footprint, the GAA for Project-impacts to finfish is necessarily large because marine populations and their dispersal patterns range over broad areas exposed to potential cumulative effects from offshore wind energy development.

Affected environment: Details on baseline conditions of the effected environment for finfish are provided in technical reports developed by Revolution Wind (Inspire Environmental 2020, 2021), which are available on BOEM's public Project website (https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021). The information presented here summarizes a refined characterization of benthic habitat conditions developed by BOEM and Revolution Wind working in collaboration with NMFS consistent with updated guidance for mapping benthic habitat (NMFS 2021a). The RWF Maximum Work Area overlaps Cox Ledge, an area of concern for fishery managers because it provides important habitat for several commercially and recreationally important species—notably, spawning habitat for Atlantic cod (*Gadus morhua*). A portion of Cox Ledge was designated by the New England Fishery Management Council (NEFMC) as a habitat management area to protect EFH for a number of managed fish species. NOAA acknowledged the importance of Cox Ledge but disapproved the designation because it concluded the proposed gear restrictions approved by the NEFMC would likely be ineffective at minimizing impacts on habitat function (NEFMC 2018; NOAA 2017a). The NEFMC (Bachman and Coutour 2022; NEFMC 2022) is currently finalizing a new EFH Habitat Area of Particular Concern (HAPC) designation that include complex habitats on Cox Ledge and surroundings used by spawning Atlantic cod and other EFH species (see Section 3.13.1.2). BOEM is currently funding a 3-year study (AT-19-08) examining movement patterns of Atlantic cod, black sea bass, and other species in the southern New England region, including the Lease Area. The study is being conducted by NMFS and a team comprising a state resource agency, a university, and a nonprofit organization (BOEM 2019). Portions of this work have been completed and preliminary reporting is presented in this Draft EIS. Peer-reviewed literature and reporting on this research may also be complete and will be considered in the Revolution Wind Final EIS if available. Given the level of concern raised

about potential impacts on Cox Ledge and Atlantic cod, the discussion of potential effects presented in the following sections places emphasis on this and other species of particular concern.

Numerous species of finfish belonging to the demersal, pelagic, and shark assemblages could occur in and near the proposed RWF and RWEC. These include several EFH species (see Section 3.13.1.2) and two ESA-listed species. The finfish resources of the region support diverse and highly valued commercial and recreational fisheries (see Section 3.9). BOEM has funded several surveys of finfish species occurrence in the RI/MA WEA, which are summarized by Guida et al. (2017).

Finfish can be divided into two general groupings—demersal and pelagic—based on their primary habitat association. Demersal species spend their adult life stage on or close to the ocean bottom and associate with specific types of benthic habitat. Examples include species like Atlantic cod, red and silver hake (*Urophycis chuss* and *Merluccius bilinearis*), and black sea bass (*Centropristis striata*) that live on or near the seafloor during one or more life stages and species like skates (Rajidae) and flatfish that spend most of their lives directly on the seafloor. Habitat preferences vary between species. For example, black sea bass, Atlantic cod, and haddock (*Melanogrammus aeglefinus*) associate primarily with complex, rocky benthic habitats (such as cobbles, boulders, and rocky reefs), while red hake and flounder use biogenic complex habitats (such as mussel or oyster reefs), artificial reefs, and shell habitats as well as hard-bottom reefs in some portions of the region.

Pelagic fishes are generally schooling fish that occupy the middle to upper water column as juveniles and adults. Pelagic species occupy the surface to midwater depths (0 to 3,281 feet [0 to 1,000 m]) from the shoreline to the continental shelf and beyond. Examples include Atlantic herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), and several shark species. Some demersal species, such as Atlantic cod and black sea bass, have pelagic eggs and larvae. Conversely, some pelagic species, such as Atlantic herring, have benthic eggs. Some purely pelagic species, like tunas (Thunnini), are highly migratory and only occur in the near-coastal and shelf surface waters of the Southern New England-New York Bight in the summer, taking advantage of the abundant prey in warm surface waters. Their eggs and larvae are pelagic and broadly distributed.

These two groups encompass a diversity of species that associate with the full range of environment types that occur in the RWF and RWEC portions of the GAA. Estuarine species, such as summer and winter flounder, are commonly found in nearshore areas, where freshwater inputs from large rivers mix with the ocean. Purely marine species are primarily found in offshore environments and include yellowfin tuna (*Thunnus albacares*), bluefin tuna (*Thunnus thynnus*), bluefish, swordfish (*Xiphias gladius*), blue shark (*Prionace glauca*), common thresher shark (*Alopias vulpinus*), and shortfin mako shark (*Isurus oxyrinchus*).

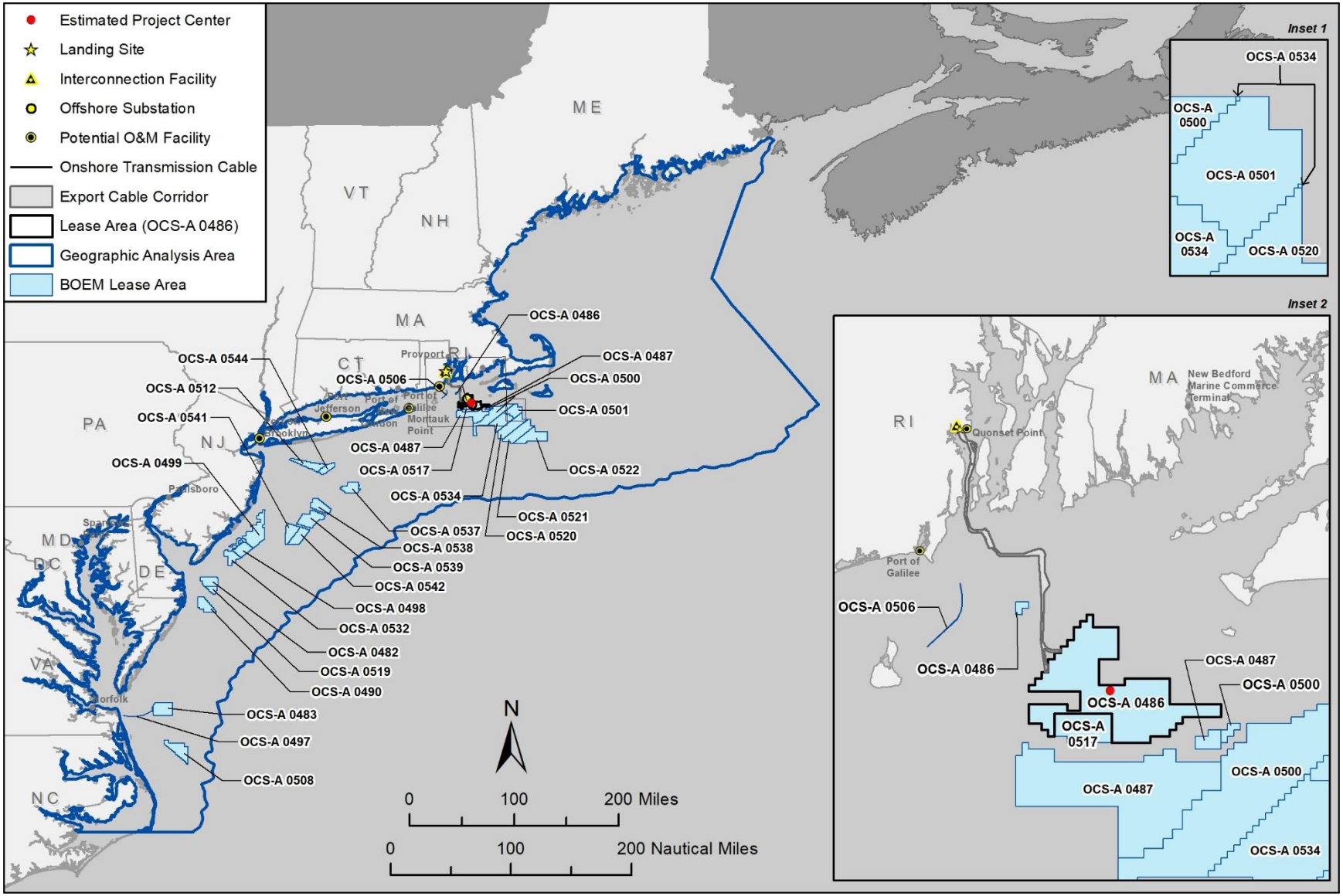

Figure 3.13-1. Geographic analysis area for finfish and essential fish habitat.

Anadromous species spawn in freshwater and migrate to the open ocean to grow to adulthood, using estuarine and nearshore marine habitats for migration and larval and juvenile rearing. Four pelagic species of anadromous fish could be present in the Project vicinity and GAA: American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and Atlantic menhaden (*Brevoortia tyrannus*) (BOEM 2013; Petruny-Parker et al. 2015; Scotti et al. 2010). Additionally, striped bass (*Morone saxatilis*) are likely to use nearshore habitats, and Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*) would use demersal habitats. The catadromous American eel (*Anguilla rostrata*) also occurs as larvae, juvenile glass eels migrating to freshwater, and adults migrating to spawning habitats in the Sargasso Sea. This species uses pelagic habitats on the OCS for larval and juvenile metamorphosis, migration, feeding, and growth (Atlantic States Marine Fisheries Commission 2000).

The demersal and pelagic fish community structure of the mid-Atlantic and southern New England OCS is shifting due to a combination of factors, including climate change, fishing pressure, and modification of coastal and estuarine habitats (NOAA 2021). For example, the fish community structure in nearby Narragansett Sound has been changing over the past 6 decades, marked by dramatic declines in abundance followed by the slow rebuilding of large predators like sharks (Selachimorpha), the declining abundance of some demersal species (winter flounder, whiting, and red hake), and the increasing abundance for others (Atlantic butterfish, scup [*Stenotomus chrysops*], black sea bass, and squid [Decapodiformes]) (Collie et al. 2008; NOAA 2021). These shifts are mirrored throughout the mid-Atlantic and southern New England regions (Hare 2016; NOAA 2021).

Five ESA-listed fish species occur in the waters of the Northwest Atlantic OCS: giant manta ray (*Manta birostris*), Atlantic salmon (*Salmo salar*), oceanic whitetip shark (*Carcharhinus longimanus*), Atlantic sturgeon, and shortnose sturgeon (*Acipenser brevirostrum*). Oceanic whitetip sharks are not known to occur in the RWF and RWEC. This species could conceivably encounter Project vessels in open ocean waters as they travel to the Lease Area from Europe. BOEM (2021a) has concluded that vessel encounters would have no effect on this species; therefore, it is not considered further in this EIS. The giant manta ray and Atlantic sturgeon are expected to occur in the open marine waters of the Mid-Atlantic OCS where they could be exposed to Project-related effects of the RWF and RWEC. Shortnose sturgeon are unlikely to occur in offshore waters but may be present in nearshore coastal waters of Rhode Island. The species has not been reliably documented within Narragansett Bay (Dadswell et al. 1984; NMFS 1998), but individuals from the nearby Connecticut River population could potentially occur there based on observed migratory patterns between other river systems in New England (Dionne et al. 2013; Fernandes et al. 2010). Critical habitat has not been designated for this species.

The giant manta ray is a pelagic relative of the sharks, most commonly found in open ocean waters well to the south of the RWF and RWEC. However, manta rays migrate seasonally over long distances, and the northern extent of their known range extends to upwelling zones along the edge of the continental shelf immediately south of and potentially including the RWF and RWEC. Critical habitat has not been designated for this species (NMFS et al. 2019). The Atlantic sturgeon is a large demersal, estuarine-dependent, anadromous species that historically spawned in medium-sized to large rivers on the U.S. Atlantic coast from Labrador to Florida (Atlantic Sturgeon Status Review Team 2007). Five separate DPSs of Atlantic sturgeon were listed under the ESA in 2012 (NOAA 2012): Chesapeake Bay (endangered), Carolina (endangered), New York Bight (endangered), South Atlantic (endangered), and Gulf of Maine (threatened). Atlantic sturgeon originating from rivers in Canada are currently not listed. The current marine range of Atlantic sturgeon extends from Labrador Inlet, Labrador, Canada, to Cape

Canaveral, Florida (NOAA 2012). Designated critical habitat comprises the core riverine and estuarine habitats used by each DPS (NMFS et al. 2017), which does not occur in the area directly impacted by the RWF and RWEC but could overlap areas transited by Project vessels. Shortnose sturgeon are an amphidromous species, meaning they spawn and live primarily in freshwater but make extensive use of estuarine and nearshore marine habitats in proximity to their natal rivers (Dionne et al. 2013). This species has been listed as endangered under the ESA since its inception. The closest documented population occurs in the lower Connecticut River approximately 50 miles to the west of the mouth of Narragansett Bay, which is within the range of nearshore migration between estuaries observed in other populations (Dionne et al. 2013; Fernandes et al. 2010).

3.13.1.1.1 Future Offshore Wind Activities (without Proposed Action)

Offshore Activities and Facilities

This section discloses potential finfish impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from BOEM guidelines provided in Section 3.3.[30]

Accidental releases and discharges: Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA (see Section 3.21 for a characterization of existing water quality conditions). In general, the types of accidental hazardous materials releases associated with marine construction projects consist of fuels, lubricating oils, and other petroleum products. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Project proponents would also be required to comply with other state and federal regulations to avoid the unintentional introduction of nonnative species. Compliance with these requirements would effectively minimize releases of trash and debris. Any accidental release of plastic or other solid debris would be highly localized, dissipate quickly, and therefore result in ecologically **negligible** adverse impacts to finfish in relation to baseline plastic pollution levels (Morét-Ferguson et al. 2010).

Increased vessel traffic associated with offshore renewable energy construction presents the potential for the inadvertent introduction of invasive species during discharge of ballast and bilge water. BOEM would require all project vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA NPDES Vessel General Permit standards, effectively avoiding the likelihood of nonnative species invasions through ballast water discharge. Considering these requirements and the dispersed distribution of planned offshore wind energy facilities, existing water quality trends are likely to continue. The impacts associated with accidental releases and discharges are anticipated to be **negligible** adverse.

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

Anchoring and new cable emplacement/maintenance: Up to 2,672 acres could be affected by anchoring/mooring activities and 21,073 acres could be affected by cable installation for future offshore wind energy development within the finfish GAA. Anchoring and cable installation activities would involve direct disturbance of the seafloor, leading to direct impacts on benthic habitats used by demersal finfish. These impacts would temporarily degrade some habitats and could change habitat structure and composition in ways that alter habitat suitability for certain species. For example, vessel anchoring in complex or large-grained complex habitats can create troughs in the seafloor that are effectively permanent (HDR 2020), and damage to structure-forming invertebrates on hard substrates can take several years to fully recover (de Marignac et al. 2008). In contrast, anchoring impacts in soft-bottom habitats are expected to fully recover within 18 to 24 months following initial disturbance through natural sediment transport (Daylander et al. 2012) and recolonization by benthic invertebrates from adjacent habitats (HDR 2020). While some short- and long-term degradation of finfish habitat from anchoring impacts could occur, these impacts would be limited in extent relative to the total amount of habitat available in the finfish GAA. The affected habitats would recover to fully functional condition for finfish without mitigation. Therefore, impacts to finfish from vessel anchoring would be **minor** adverse.

Under the No Action Alternative, up to 10,024 miles of cable installation would be added in the GAA for finfish. These activities would result in short- and long-term seafloor profile alterations that are likely to affect both the physical structure of the habitat and habitat-forming invertebrates used by demersal finfish as habitat. Placement of cable protection would introduce human-made hard surfaces to the seafloor, resulting in a long-term change in benthic habitat composition. Short-term alterations would occur in soft-bottom habitats and would result from the flattening of sandwaves and damage to biogenic structures like worm tubes and burrows and depressions formed by fish and invertebrates during seafloor preparation for cable installation. Seafloor preparation in large-grained complex and complex benthic habitats could result in long-term changes in seafloor profile. For example, boulder relocation during seafloor preparation could convert existing complex benthic habitat to heterogeneous complex habitat by creating a furrow of soft-bottom habitat within the larger matrix. Similarly, boulders and cobbles rolled into soft-bottom habitat would constitute a long-term change in the seafloor profile of the affected area. Jet plowing to bury cable would result in short-term disruption to benthic communities through sediment suspension, physical disturbance, physical displacement, and egg and larva entrainment (see Section 3.13.2.2.1). Collectively, these impacts would alter the suitability of the affected habitat for different finfish species, with the effects depending on habitat association. For example, species that associate with soft-bottom substrates (e.g., summer flounder [*Paralichthys dentatus*]) would gain habitat in areas where boulder relocation exposes swaths of sand and lose habitat where boulder relocation and cable protection replace sandy substrates with new hard surfaces. The affected habitats would eventually recover to full function, and any net losses of habitat suitability for any individual species would be localized minor adverse.

In summary, vessel anchoring and cable installation and maintenance could result in both short-term and long-term impacts to habitats used by demersal finfish, varying based on the type of habitat affected and the nature of the impact. These impacts would be limited in extent to the footprint of the disturbance. Impacts to soft-bottom habitats would be short term in duration, and habitats would recover completely without additional mitigation. Some long-term to permanent changes in complex habitat structure could occur, but the functions provided by habitat-forming invertebrates would eventually recover without mitigation. On this basis, impacts to finfish from anchoring and new cable emplacement/maintenance would be **minor** adverse.

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

Climate change: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the finfish community of the GAA and surrounding region, including several EFH species. For example, several finfish species have shifted in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). Warmer water could influence finfish migration and could increase the frequency or magnitude of disease (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Climate change is also contributing to shifts in finfish geographic ranges, individual fish health and viability, increased frequency of fatal marine heatwaves, and apparent reductions in marine productivity (NOAA 2021). These trends are expected to continue under the No Action Alternative. The intensity of impacts to finfish from climate change are uncertain but are anticipated to be **moderate** adverse overall, varying in significance by species.

EMF: At least 10 submarine power and communications cables are in the vicinity of the RWEC corridor, with most running parallel to the RWEC. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables are not specified, the associated baseline EMF effects can be inferred from the available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. EMF effects from submarine power cables would be similar in magnitude to those described for the Proposed Action but would vary depending on specific transmission load. For example, the two power cables supplying Nantucket Island at a typical load of 46 kV and 420 amps (Balducci et al. 2019) are generally comparable to the 66-kV and 480-amp IAC cable.

Under the No Action Alternative, up to 10,024 miles of cable installation would be added in the finfish GAA, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that proposed offshore wind energy projects would use HVAC transmission, but HVDC designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects. EMF effects on finfish from these future projects would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). Because measurable EMF effects are generally limited to within tens of feet of cable

corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be negligible adverse. However, Hutchison et al. (2018, 2020a) have observed behavioral responses in rays experimentally exposed to EMF from HVDC transmission. Electrosensitive fishes are adapted to detect biogenic DC EMF or EMF with AC frequencies below 10 Hz (CSA Ocean Sciences Inc and Exponent 2019). Thus, the exclusive use of 60 Hz AC in underwater transmission cables for offshore wind is not expected to induce significant behavioral responses in electrosensitive animals. In general, the widespread development of transmission infrastructure for offshore wind energy may result only in localized EMF effects of sufficient intensity to affect the behavior of individual finfish. Measurable EMF levels would diminish rapidly with distance, typically becoming indistinguishable from the baseline conditions within less than 30 feet of both buried and exposed cable segments (Exponent 2021). EMF sufficient to cause behavioral effects in fish would be highly localized, typically restricted to areas within 3 feet or less of exposed cable segments. Localized and short-term EMF effects on individual finfish would occur throughout the life of each wind energy project but are unlikely to have measurable population-level effects on any species at the scale of the GAA. Therefore, EMF from planned and potential future activities would have a **negligible to minor** adverse effect for HVAC, or **moderate** adverse if HVDC is used.

Noise: Several proposed offshore wind construction projects could be developed on the mid-Atlantic OCS between 2022 to 2030, including some projects in proximity to the RWF (see Appendix E). This would result in noise-generating activities, specifically, impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operations. BOEM believes it is reasonable to conclude that impact pile driving, construction vessel, and HRG survey noise from future projects would generate short-term adverse effects on finfish within the GAA. Due to the unknowns associated with future projects, the timing, extent, and severity of these effects on habitat and aquatic community structure cannot currently be quantified.

The planned and future development of offshore wind energy facilities could affect the endangered Atlantic sturgeon and the threatened giant manta ray, primarily through exposure to harmful levels of underwater noise during project construction. Adult and subadult endangered Atlantic sturgeon are expected to occur in the GAA throughout the year but appear to be present in lower numbers in the summer (Dunton et al. 2015; Ingram et al. 2019; Savoy and Pacileo 2003; Stein et al. 2004). The GAA for finfish is used by all five ESA-listed DPSs of Atlantic sturgeon, and individuals from these DPSs could be exposed to construction and O&M-related effects on demersal finfish species. The threatened giant manta ray is expected to occur in the waters south of the RI/MA WEA, within upwelling waters at the edge of the continental shelf break. Giant manta ray occurrence on the mid-Atlantic OCS is rare (Miller and Klimovich 2017), but occurrence in proximity to some proposed future actions within the GAA cannot be completely discounted. The most significant impacts on Atlantic sturgeon and giant manta ray are expected from exposure to pile-driving noise and UXO detonation during construction. However, potentially harmful noise levels would be expected to occur close to the pile, and most mobile fish would be expected to move away from pile-driving activities, limiting the potential effects of elevated underwater noise levels. Given that construction noise impacts from future projects are likely to be similar to those described in Section 3.13.2.2.1 for construction of the Proposed Action, effects to Atlantic sturgeon and giant manta ray from individual projects would be limited to short-term minor adverse behavioral effects and disturbance. Shortnose sturgeon are unlikely to be exposed to impact pile-driving noise from RWF construction but could be exposed to underwater noise from UXO detonation and

RWEC construction activities in Narragansett Bay. For this reason, planned and reasonably foreseeable future activities are not likely to result in adverse population-level consequences on either of these species and would therefore be **minor** adverse.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 L_{RMS}, occasionally reaching as high as 128 L_{RMS}, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 SPL) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on finfish, including EFH species, could be more intense and extensive than those considered herein, but the findings have not been validated. In general, these noise levels are below established behavioral thresholds for fish (see Table 3.6-7, Section 3.6.2.3.1), comparable to environmental baseline levels in busy marine traffic areas, and unlikely to be detectable to fish outside of the respective wind farm footprints. The available information suggests the effects of operational underwater noise from future activities would occur for the life of the project but are not anticipated to have population-level effects and would therefore be **moderate** adverse.

Presence of structures: The future addition of up to 3,008 new WTG and OSS foundations on the mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints. This could in turn influence the abundance and distribution of finfish species. While hydrodynamic and reef effects would largely be limited to the areas within and or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that are beneficial for some finfish species and detrimental for others.

The widespread development of offshore renewable energy facilities would create a distributed network of artificial reefs on the mid-Atlantic OCS. These reefs form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In general, species that are attracted to the structural complexity and increased biological productivity provided by the structures may benefit and increase in abundance. In contrast, species associated with soft-bottom habitats may be permanently displaced by the long-term presence of the structures. Those changes could influence fish community structure within the GAA in the future, but the likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research. Artificial structures may also provide opportunities for range expansion by invasive species in conjunction with range shifts due to climate change (Degraer et al. 2020; Langhamer 2012; Schulze et al 2020). Overall, these effects would range in significance from **minor** adverse for some species to **moderate** beneficial for others.

The Mid Atlantic Bight cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of fish species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with

shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The GAA and neighboring lease areas within the RI/MA and MA WEAs are located on the approximate northern boundary of the cold pool. The potential effects of extensive wind farm development on features like the cold pool is a topic of emerging interest and ongoing research (Chen et al. 2016). Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and fish community structure but the extent and significance of these potential effects are largely unknown.

BOEM has conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including full build-out of both WEAs with a total of 1,063 WTG and OSS foundations. They determined that all scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. Johnson et al. (2021) used an agent-based model to evaluate how these oceanographic impacts could affect planktonic dispersal and larval settlement for two fish species (summer flounder and silver hake) and the Atlantic sea scallop (*Placopecten magellanicus*). They determined that offshore wind development could affect egg and larval dispersal patterns, leading to increases in larval settlement density in some areas and decreases in others. For example, silver hake larval settlement was modeled to increase in the undeveloped region east of proposed offshore wind leases under a scenario that considered full development of all planned offshore wind facilities due to induced changes to current speeds. In contrast, summer flounder would experience a slight reduction in the density of settled larvae in central Nantucket Sound and an increase in larval density in inshore coastal habitats on Montauk and Nantucket Islands, Rhode Island, and Connecticut under the same scenario (Johnson et al. 2021). However, these small and localized effects are unlikely to be biologically significant at population levels as the larvae of these species originate from both local and distant spawning areas and are dispersed throughout the region (Johnson et al. 2021).

While hydrodynamic impacts on finfish are likely to vary between species, the modeled findings for summer flounder and silver hake are likely representative of the magnitude of potential effects on most fish species having planktonic larvae. Localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource. This impact would be effectively permanent.

Sediment deposition and burial: Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. The resulting effects on finfish would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017) but would vary in extent and severity depending on the type and extent of disturbance and the nature of the substrates. For example, fish exposed to low levels of suspended sediment on the order of 100 to 500 mg/L may simply suspend feeding and avoid the affected area. Fish exposed to higher concentrations of suspended sediments (e.g., greater than 1,000 mg/L) may experience short-term stress and physiological injury. The benthic eggs and larvae of some finfish species are sensitive to burial and could be injured or killed by sediment deposition (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). While sensitivity varies widely, the eggs and larvae of some species can be killed by as little as 0.4 inch (10 mm) of sediment deposition. The eggs of certain species, like winter flounder, are particularly sensitive and can be killed by burial depths less than 0.1 inch (3 mm) (Michel et al. 2013).

Effects of this magnitude are likely to occur during the construction of any planned or potential future offshore wind energy project. The highest suspended sediment levels would occur closest to the disturbance and would dissipate with distance, generally returning to baseline conditions within a few hours (RPS 2021). Observations from the construction of the BIWF showed that suspended sediments returned to baseline levels faster than predicted by preconstruction modeling (HDR 2020). In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels within the GAA, resulting in short-term minor adverse effects on finfish. However, most fish species are mobile enough to avoid harmful suspended sediments.

While suspended sediment and burial effects are an unavoidable consequence of offshore wind energy construction, O&M, and decommissioning, these effects would be limited in extent and short term in duration, effectively ending once the sediments have resettled. Individual finfish could be adversely affected, but the number of individuals impacted and the duration of effects would be unlikely to adversely affect any finfish species at the population level at the scale of the GAA and would therefore be **minor** adverse.

3.13.1.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on finfish associated with the Project would not occur. However, ongoing and future activities would have continuing short-term, long-term, and permanent impacts on finfish primarily through pile-driving noise, new cable emplacement, and the presence of structures related to other wind projects within the GAA. Climate change impacts would similarly continue to impact finfish populations regionally.

BOEM anticipates that the impacts of ongoing activities, especially continued fishing, dredging, and climate change, would be **moderate** adverse for finfish species in the GAA. In addition to ongoing wind farm activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on finfish. Based on the same reasonably foreseeable activities noted above, BOEM anticipates that the impacts of reasonably foreseeable new activities (e.g., increased vessel traffic) other than offshore wind would be **minor** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on finfish, primarily driven by ongoing fishing activities.

The combined significance criteria are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends (i.e., climate change), and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts and could potentially include **moderate** beneficial impacts to finfish. Future offshore wind activities are expected to generate impacts under several IPFs, the most prominent being the presence of structures—namely, foundations and scour/cable protection.

The No Action Alternative would forgo the fisheries monitoring that Revolution Wind has voluntarily committed to perform, the results of which could provide an understanding of the effects of offshore wind development; benefit future management of finfish; and inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

3.13.1.2 Essential Fish Habitat

Geographic analysis area: The GAA for EFH is the same as that described above for finfish (see Figure 3.13-1).

Affected environment: The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on activities that could adversely affect EFH. NOAA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA 2004, 2018). The majority of the EFH-listed species occurring in the waters of the mid-Atlantic and southern New England OCS are managed under federal fishery management plans (FMPs) developed by the NEFMC and the Mid-Atlantic Fishery Management Council (MAFMC) (2018; NEFMC 2018). In addition to these species, several other protected and/or highly migratory species that are managed through FMPs developed by NMFS (2019) are known or likely to occur in the GAA.

EFH has been designated for the following species or management groups that occur on the southern New England and mid-Atlantic OCS (MARCO 2019):

- Northeast multispecies (e.g., Atlantic cod, haddock, Atlantic pollock [*Pollachius virens*], and summer flounder)
- Shellfish, Atlantic sea scallop, Atlantic surfclam (*Spisula solidissima*), and ocean quahog (*Arctica islandica*)
- Monkfish (Lophius americanus)
- Atlantic herring
- Skates
- Small-mesh species (e.g., silver hake and red hake)
- Bluefish
- Mackerel (*Scomber scombrus*), squids, and butterfish
- Highly migratory species (e.g., tunas, swordfish, sharks, and billfish [Istiophoridae]
- Atlantic salmon
- Tilefish (Malacanthidae)
- Red crab (Chaceon quinquedens)
- Scup and black sea bass
- Spiny dogfish (Squalus acanthias)

Some, but not all, of the EFH species covered by the respective FMPs occur within the RWF and RWEC.

NOAA and fishery management councils also identify HAPCs as a subset of EFH. HAPCs are high-priority areas for conservation, additional management focus, or research because they are rare, sensitive, stressed by development, and/or important to ecosystem function. The only currently designated HAPCs that could be impacted by Project activities are specific habitats for both adult and juvenile summer flounder and juvenile Atlantic cod. However, in July 2022, the NEFMC approved a proposed HAPC

designation comprising large-grained complex and complex benthic habitats wherever present within the area bounded by a 6.2-mile buffer around the RI/MA and MA WEAs (Plante 2022). The designation is intended to protect high-value complex habitats within this area, emphasizing currently known and potentially suitable areas used by Atlantic cod for spawning (Bachman and Couture 2022; NEFMC 2022). This designation would also apply to large-grained complex and complex benthic habitats used by Atlantic herring, Atlantic sea scallop, little skate, monkfish, ocean pout, red hake, silver hake, windowpane flounder, winter flounder, winter skate, and yellowtail flounder. This new HAPC designation is currently being finalized and has not yet been implemented.

The summer flounder HAPC includes all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes (i.e., submerged aquatic vegetation [SAV]) in any size bed, as well as loose aggregations found within currently designated adult and juvenile summer flounder EFH. In locations where native SAV species have been eliminated from an area, then exotic species are included (MAFMC et al. 1998). The HAPC for juvenile Atlantic cod is defined as intertidal and benthic structurally complex habitats to a maximum depth of 396 feet (120 m), including eelgrass, mixed sand and gravel, and rocky habitats. The range for juvenile cod in these habitats extends from Maine through, and including portions of, Rhode Island. These habitats occur in proximity to the RWEC corridor and could be affected by cable emplacement and maintenance and suspended sediment deposition and burial effects.

3.13.1.2.1 Future Offshore Wind Activities (without Proposed Action)

Offshore Activities and Facilities

This section discloses potential EFH impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1. The duration of impacts disclosed for this resource deviate slightly from general guidelines provided in Section 3.3.

Accidental releases and discharges: As stated previously for finfish, offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA (see Section 3.21 for a characterization of existing water quality conditions). In general, the types of accidental hazardous materials releases that would impact finfish would also impact EFH. Project proponents would be required to comply with state and federal regulations to avoid the discharge of solid debris and unintentional introduction of nonnative species. Compliance with BOEM and USCG requirements would effectively minimize releases of trash and debris. Similar to finfish, effects on EFH would be expected to be **negligible** adverse.

Anchoring and new cable emplacement/maintenance: Offshore wind energy facility construction would involve direct disturbance of the seafloor bed leading to direct impacts on EFH. In general, these effects would be localized to the disturbance footprint and vicinity. The specific type and extent of habitat conversion and resulting effects would vary depending on the project design, species present, and site-specific conditions. Future activities would also disturb up to 21,073 acres of seafloor during cable installation, although the impacts from this disturbance on EFH would be **minor** adverse. See Section 3.13.1.1.1 for additional details.

Climate change: As stated previously for finfish, climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under

the No Action Alternative. The intensity of impacts resulting from climate change are uncertain but are anticipated to be **minor** to **moderate** adverse.

EMF: At least seven submarine power and communications cables are in the vicinity of the RWEC corridor, with most running parallel the RWEC. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables are not specified, the associated baseline EMF effects can be inferred from the available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects.

Under the No Action Alternative, up to 10,024 miles of cable installation would be added in the GAA, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that proposed offshore wind energy projects would use HVAC transmission, but HVDC designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operations. EMF effects on EFH from these future projects would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). Because measurable EMF effects are generally limited to within tens of feet of cable corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be **negligible** adverse. However, Hutchison et al. (2018; 2020a) have observed behavioral responses in electrosensitive fish that were exposed to EMF from a HVDC cable in a controlled environment. These findings suggest more extensive behavioral impacts resulting in higher level (e.g., **minor** or **moderate**) adverse effects could result should future projects use HVDC transmission.

Noise: As mentioned above for finfish, several proposed offshore wind projects could be developed on the mid-Atlantic OCS between 2022 to 2030, including some projects in proximity to the RWF (see Appendix E), resulting in noise-generating activities. BOEM believes it is reasonable to conclude that future projects could result in **negligible to moderate** adverse effects to EFH.

Presence of structures: As discussed under finfish, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions northern Mid-Atlantic Bight. BOEM determined that small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight would occur. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. However, these localized and small effects are unlikely to be biologically significant at population levels (Johnson et al. 2021).

While hydrodynamic impacts on EFH are likely to vary between species, the modeled findings for summer flounder and silver hake are likely representative of the magnitude of potential effects on species having planktonic larvae. Localized changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** adverse impact on this resource. This impact would be effectively permanent.

The future addition of up to 3,008 new WTG and OSS foundations on the mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints. This could in turn influence the abundance and distribution of EFH species. While hydrodynamic and reef effects would largely be limited to the areas within and/or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that would be permanent and **moderate** beneficial for some species from habitat conversion and have **minor** adverse effects due to permanent habitat loss. New structures would attract structure-oriented fishes as long as the structures remain. Abundance of certain fishes could increase with short-term to permanent **moderate** adverse impacts.

Hydrodynamic disturbance resulting from the broadscale development of large offshore wind farms is a topic of emerging concern because of potential effects on the Mid-Atlantic Bight cold pool. The cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of fish species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The GAA and neighboring lease areas within the RI/MA and MA WEAs are located on the approximate northern boundary of the cold pool. The potential effects of extensive wind farm development on features like the cold pool is a topic of emerging interest and ongoing research (Chen et al. 2016). Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and fish community structure but the extent and significance of these potential effects are unknown.

Sediment deposition and burial: As discussed under finfish, cable placement and other related construction activities would create plumes of fine sediment that would disperse and resettle. These effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on fish but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels within the GAA, resulting in short-term **minor** adverse effects.

3.13.1.2.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on EFH resulting from the Project would not occur. However, ongoing and future activities would have continuing short-term to long-term impacts on EFH species and habitats, primarily as a result of construction-related noise impacts, operational noise, seafloor disturbance and habitat modifications, hydrodynamic and reef effects resulting from the presence of offshore wind energy structures, and the interactions between these impacts and the ongoing effects of climate change.

The combined significance criteria are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts of ongoing activities—especially fishing, dredging, and climate change—would be **moderate** adverse for EFH species. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind could

also contribute to impacts on EFH. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind on EFH would be **minor** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on EFH, primarily driven by ongoing fishing activities.

BOEM anticipates that future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse and could potentially include **moderate** beneficial impacts to EFH. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures—namely, foundations and scour/cable protection.

The No Action Alternative would forgo the fisheries monitoring that Revolution Wind has voluntarily committed to perform, the results of which could provide an understanding of the effects of offshore wind development; benefit future management of EFH; and inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

3.13.2 Environmental Consequences

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

The analysis presented in this section considers the impacts resulting from the maximum-case scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum-case scenario specifications defined in Appendix D, Table D-1 are PDE parameters used to conduct this analysis. Several Project parameters could change during the development of the final Project configuration, potentially reducing the extent and/or intensity of impacts resulting from the associated IPFs. The design parameters in Table 3.13-1 would result in reduced impacts relative to those generated by the design elements considered under the PDE.

Table 3.13-1. Project Design Parameters That Could Reduce Impacts

Design Parameter	Description
Fewer WTGs could be permitted	Resulting in fewer offshore structures and reduced IAC length. This would reduce the extent of short-term to permanent impacts on EFH and finfish by reducing the extent of habitat disturbance and suspended sediment deposition impacts from installation of foundations, cables, and scour and cable protection, and associated vessel anchoring activities; reducing the extent and duration of underwater noise impacts from WTG foundation installation; and reducing the extent of reef and hydrodynamic effects resulting from structure presence.
The use of a casing pipe method to construct the RWEC sea-to-shore transition	Would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam (Zeddies 2021).

The use of a temporary cofferdam for RWEC sea-to-shore transition construction	Would reduce turbidity, sediment deposition, and burial effects on finfish and EFH.

See Appendix E1 for a summary of IPFs analyzed for finfish and EFH across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E, Table E2-4. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives. The duration of impacts (temporal scale) disclosed for this resource deviate slightly from general guidelines provided in Section 3.3.

Table 3.13-2 provides a comparison of all evaluated IPFs for finfish and EFH across alternatives. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on finfish and EFH. These EPMs are summarized in Appendix F, Table F-1.

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

The conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination. Overall, each alternative would result in **moderate** adverse to **moderate** beneficial impacts on finfish and EFH in the GAA, varying by species. Moderate adverse effects could occur because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken. Some finfish species could realize moderate beneficial effects from reef effects, which would increase the extent and quality of local habitat for and the abundance of species common to the proposed project area over the life of the project.

Table 3.13-2. Alternative Comparison Summary for Finfish and Essential Fish Habitat

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Finfish						
Accidental releases and discharges	**Offshore:** Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). BOEM would require all project construction vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge. Compliance with these and other requirements would effectively minimize releases of trash and debris or nonnative species invasions through ballast water discharge, resulting in ecologically **negligible** adverse impacts.	**Offshore:** BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operations of offshore wind energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (vhb 2022). Project proponents would also be required to comply with other state and federal regulations to avoid the introduction of nonnative species. Given these restrictions, the impact to finfish from trash and debris from the Project is **negligible** adverse. Given the low potential for spills and the minimal risk of exposure to small short-term spills, the impact from Project-related petroleum spills under reasonably foreseeable circumstances is **negligible** adverse. In the unlikely event of a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects on finfish could potentially result. BOEM estimates that the Project when combined with other offshore wind projects would result in approximately 19 million gallons of coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the finfish GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration.	**Offshore:** The risk of accidental releases and discharges under Alternatives C through F would be similar as those described for the Proposed Action and would have a **negligible** adverse impact on finfish because of the low probability of the risk and EPM implementation. The Project would comply with all requirements that disallow the discharge or disposal of solid trash or debris (vhb 2022). Moreover, Alternatives C through F would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial effect on finfish. BOEM anticipates that all projects would follow strict oil spill prevention and response procedures, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. For this reason, Alternatives C through F when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration.			
Anchoring and new cable emplacement/ maintenance	**Offshore:** Anchoring and cable installation activities would involve direct disturbance of the seafloor, leading to direct impacts on benthic habitats used by demersal finfish. However, these impacts would be limited in extent relative to the total amount of habitat available in the finfish GAA. The affected habitats would recover to fully functional condition for finfish without mitigation. Therefore, impacts to finfish from vessel anchoring and cable installation would be **minor** adverse.	**Offshore:** Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. On balance, entrainment of eggs and larvae would constitute a short-term adverse impact on finfish that would not result in measurable population-level impacts. Therefore, these impacts would be **minor** adverse. Anchoring, cable protection maintenance, and the eventual decommissioning and removal of buried cables would produce similar effects on finfish as those described for Project construction. These would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of finfish using these habitats. The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSSs into the water column. It is anticipated that these activities would result in short term **minor** adverse impacts to finfish. BOEM estimates a cumulative total of 5,850 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish GAA. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects and other stressors would result in **minor** to **moderate** adverse cumulative impacts to finfish.	**Offshore:** Alternatives C through F would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable construction and maintenance-related impacts on benthic habitat and finfish would decrease commensurately, although effects would still be **minor** adverse. Alternatives C through F surface occupancy would noticeably reduce the cumulative impact acreage across projects relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. Therefore, the Habitat Alternative when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to fish habitat and finfish.			
Bycatch	**Offshore:** A range of monitoring activities has been proposed to evaluate the short-term and long-term effects of existing and	**Offshore:** Revolution Wind is proposing to implement the FRMP as part of the Proposed Action (Revolution Wind and Inspire Environmental 2021). The FRMP employs a variety of	**Offshore:** The Project would implement the FRMP regardless of the alternative or alternative configuration selected. The impacts of the FRMP			

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	planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect finfish through direct sampling and the potential for bycatch and/or damage by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts, although the distribution of those impacts could change. As such, any bycatch-related impacts on finfish would be **negligible** to **minor** adverse and short term in duration.	survey methods to evaluate the effect of RWF construction and operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. While the FRMP would result in unavoidable impacts to individual finfish, the extent of habitat disturbance and the number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. As such, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on finfish.	on finfish would therefore be the same under Alternatives C through F as those described for the Proposed Action. Therefore, implementation of the FRMP, in combination with the anticipated impacts of other planned and likely future monitoring activities would result in **minor** adverse cumulative effects to finfish in the GAA. Alternatives C through F and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect for finfish resources.			
Climate change	**Offshore:** Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under the No Action Alternative. The intensity of impacts to finfish from climate change are uncertain but are anticipated to be **moderate** adverse overall, varying in significance by species.	**Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts, resulting in **moderate** adverse cumulative impacts.	Offshore: Climate change–related impacts to finfish under the Habitat Alternative would be the same as the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue under Alternatives C through F. The intensity of climate change cumulative impacts on finfish is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse cumulative impacts.			
EMF	**Offshore:** Under the No Action Alternative, up to 10,024 miles of cable installation would be added in the finfish GAA, producing EMF in the immediate vicinity of each cable during operations. Localized and short-term EMF effects on individual finfish would occur throughout the life of each wind energy project but are unlikely to have measurable population-level effects on any species at the scale of the GAA. Therefore, EMF from planned and potential future activities would have a **negligible to minor** adverse effect for HVAC, or **moderate** adverse if HVDC is used.	**Offshore:** Behavioral responses have been observed in some fish species exposed to EMFs, but clear relationships have yet to be established. The Project includes design measures to minimize EMF impacts. Rapid dissipation of EMF over distance therefore means that the effects are highly localized and are expected to be **minor** adverse. While uncertainties remain, future actions that produce EMF effects on the order of those generated by the Proposed Action are unlikely to have significant cumulative effects on finfish. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore result in **minor** adverse effects on finfish from exposure to detectable levels of EMF in limited areas for HVAC, or **moderate** adverse if HVDC is used.	**Offshore:** Alternatives C through F would result in similar EMF impacts on finfish to those described for the Proposed Action, but those impacts would be reduced in extent due to reductions in the overall length of IAC cable and the total area exposed would vary depending on the configuration selected (see Table 3.6-10, Table 3.6-26, Table 3.6-27, and Table 3.6-28). The most intense EMF impacts would occur immediately above exposed cable segments and are the most likely effects to be detectable by finfish. EMF strength would diminish rapidly with distance, becoming undetectable within approximately 30 feet of the cable path (Exponent 2021), resulting in **minor** adverse effects. Alternatives C through F EMF effects would combine with those generated by the 10,024 miles of new and existing transmission cables from the other new offshore wind facilities planned on the mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to the No Action Alternative but would occur over a larger area, as determined by the broader project footprint. Cumulative impacts to finfish would therefore be **minor** adverse for HVAC, or **moderate** adverse if HVDC is used.			
Noise	**Offshore:** Future offshore wind projects would result in noise-generating activities, specifically, impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operations. The available information suggests the effects of operational underwater noise	**Offshore:** Project construction is likely to result in short-term to long-term noise impacts sufficient to cause a range of effects on finfish. These effects range from behavioral responses, masking of biologically important sounds and temporary hearing threshold shifts, to direct injury and mortality. The significance of these effects are likely to vary by species, depending on	**Offshore:** See Section 3.13.2.4.1 for construction impacts Underwater and operational noise effects on finfish for Alternatives C through F would be similar in magnitude but reduced in extent relative to those described for the Proposed Action. The same O&M vessels would			

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	from future activities would occur for the life of the project but are not anticipated to have population-level effects and would therefore be **moderate** adverse.	the number of individuals exposed and the degree to which noise impacts might interfere with important biological functions like spawning. Restriction of pile-driving activity to times outside the cod spawning season would minimize adverse impacts on Atlantic cod spawning and likely avoid broader population-level effects. On balance, construction noise impacts on finfish would likely range from **minor** to **moderate** adverse. Measurable operational noise would result from the Proposed Action, producing effects detectable by finfish. Those effects are likely to vary in significance by species depending on hearing sensitivity. Effects on species that lack a swim bladder, like sharks, rays, and flatfish, and hearing generalist species like ocean pout, butterfish, scup, and tunas, are likely to be biologically insignificant and therefore **minor** adverse. In contrast, operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock, pollock, and hake, to communicate effectively within a few hundred feet of each turbine. The significance of these effects could range from **minor** to **moderate** adverse depending on how each species uses the affected area during periods when communication is important. Decommissioning of the RWF and RWEC would lead to impacts similar to those generated during construction, with the exception that there would be no pile-driving impacts. The impacts of short-term bed disturbance and water quality effects on fish would be **negligible** to **minor** adverse. BOEM estimates that underwater noise from the construction of up to 16 other offshore wind facilities would result in short-term injury or behavioral effects on finfish over a cumulative area of up to PENDING square miles. Vessel noise from the construction and installation as well as operations and maintenance activities could cause startle and avoidance responses in fish but would not cause injury. Operations and maintenance vessels as well as operations of the WTGs would be permanent impacts across the life of the project that could result in behavioral responses. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **moderate** adverse. The Proposed Action and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect on finfish resources.	be used, but fewer vessel trips would be required overall, so the extent and duration of vessel-related noise exposure would also decrease. Noise effects on finfish from WTG operations could range from **minor** to **moderate** adverse depending on how each species uses the affected area during period when communication is important. For example, operational noise exceeding ambient levels could theoretically cause masking effects that reduce the effective communication range for species like cod and haddock. Alternatives C through F effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. This could include cumulative impacts to ESA-listed Atlantic sturgeon and manta ray. Cumulative impacts to shortnose sturgeon are unlikely to occur because their distribution is limited to habitats that are unlikely to be affected by other planned and potential future projects. Fish near impact and vibratory pile-driving activities and UXO detonation could be injured or killed, while behavioral effects on fish would extend over greater distances due to vessel activity and O&M-related noise. Such effects, particularly O&M-related noise would be long term in duration but are unlikely to have a measurable effect on any finfish population at the scale of the GAA. On this basis, cumulative effects on finfish are likely to be **negligible** to **moderate** adverse.				

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Presence of structures	**Offshore:** The future addition of up to 3,008 new WTG and OSS foundations on the mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints. Those changes could influence fish community structure within the GAA in the future, but the likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research. Artificial structures may also provide opportunities for range expansion by invasive species in conjunction with range shifts due to climate change (Degraer et al. 2020; Langhamer 2012; Schulze et al 2020). Overall, these effects would range in significance from **minor** adverse for some species to **moderate** beneficial for others.	**Offshore:** The installation of up to 102 offshore structures in the form of monopile foundations with associated scour protection would result in the direct disturbance of finfish. The extent of exposure would vary by species and habitat association. Some individual finfish would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. Residual short- to long-term impacts from construction would continue to affect approximately 6,400 additional acres of benthic habitat not otherwise altered by the presence of structures. The time required for functional recovery would vary by habitat type, with soft-bottomed habitats recovering relatively quickly, while impacts to large-grained complex and complex benthic habitats could persist for several years. Therefore, effects to finfish and their habitats from project construction would be **minor** adverse. During operations, the potential effects to finfish and their habitats resulting from the presence of structures are likely to vary by species. The presence of foundations, scour protection, and cable protection would permanently alter the composition and structure of approximately 221 acres of benthic habitat. The available evidence suggests that some demersal fish species are likely to benefit from increased habitat structure and biological productivity, while pelagic fishes may also benefit to a lesser extent. However, considerable uncertainty remains about the broader effects of this type of habitat alteration at population scales (Degraer et al. 2020). The Proposed Action is relatively small in scale compared to existing, pending, and planned wind farm developments, suggesting that broader population effects from this one facility are unlikely. Hydrodynamic effects caused by the presence of the windfarm could alter dispersal patterns for pelagic eggs and larvae, which could influence the productivity of some spawning fish populations. Modeling of hydrodynamic effects on representative fish species indicates that any such effects are likely to be localized and not biologically significant at population scales (Johnson et al. 2021). However, this modeling effort did not consider potential effects on fish stocks, such as Atlantic cod, that spawn in specific locations. In theory hydrodynamic effects on these species could be more significant, but the available information does not suggest that such effects are likely. Hydrodynamic and reef effects could become more significant when combined with those from other planned offshore wind energy projects in the future. On this basis, habitat alteration on finfish resulting from the Proposed Action are expected to be long term in duration and **minor** beneficial to **moderate** adverse in significance. The Proposed Action includes regular inspections of the RWF to identify and remove derelict fishing gear and other trash and debris. Other future projects are expected to include similar measures in their O&M plans, creating an effective mechanism for identifying and removing derelict fishing gear and other dangerous marine debris from the GAA. Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** beneficial cumulative effects on finfish from removal of derelict fishing gear and marine debris.	**Offshore:** A comparison of the benthic habitat disturbance footprints for foundation installation under the different configurations of Alternatives C through F and the Proposed Action is provided in Table 3.6-4, Table 3.6-11, Table 3.16-12, and Table 3.6-13 in Section 3.6. Implementation of Alternative F in conjunction with Alternatives C, D, and E is estimated to further reduce seafloor disturbance for these alternatives by up to 8% (Alternative C), 21.5% (Alternative D), and 8% (Alternative E). Non-mobile life stages of finfish within these respective footprints would be exposed to displacement, behavioral disturbance, crushing and burial effects. While this alternative would result in slightly less area exposed to potentially harmful effects, construction impacts would not change relative to the Proposed Action: **minor** adverse. Once operational, alternatives C through F would result in long-term to permanent changes in benthic habitat composition and structure similar in nature to those caused by the Proposed Action but differing in extent and distribution. Notably, Alternative C would result in less extensive impacts to large-grained complex and complex habitats on Cox Ledge than the Proposed action and Alternatives C and D. These habitats are of particular importance to Atlantic cod and several other EFH species. The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef, and broader-scale hydrodynamic effects that could alter how the pelagic eggs and larvae of some fish and invertebrate species are dispersed across the northern Mid-Atlantic Bight. This could lead to negative, positive, or neutral effects on EFH species that rely on these dispersal patterns, varying by species. The reef effect would alter biological community structure, producing an array of effects on EFH species. Those effects could be beneficial or adverse, varying by species. Alternatives C through F would produce similar hydrodynamic and reef effects on finfish to those described for the Proposed Action, but those effects would be reduced in extent because fewer structures would be installed. Reef and hydrodynamic effects would be distributed differently, based on the alternative configuration selected, and insufficient information is available to determine if this would result in substantive differences in effects to finfish between alternatives. Operational effects to finfish would range from **moderate** adverse to **moderate** beneficial, varying by species and depending on their ability to exploit new habitats created by the placement of artificial structures.			

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		Cumulative effects are likely to vary by species and could be positive or negative, Cumulative impacts from hydrodynamic and artificial reef effects would likely range from **moderate** beneficial to **moderate** adverse in significance, while cumulative impacts from debris removal are likely to be **minor** beneficial. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on finfish could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.	Similarly, impacts generated during decommissioning would be of similar intensity as those generated under the Proposed Action but reduced in extent and duration, ranging from **minor** to **moderate** adverse depending on the species exposed. Individual finfish could be injured or killed during structure removal; the fish community formed around artificial structures would be dispersed; and individuals that are unable to locate new suitable habitats might not survive. Alternatives C through F is comparable in scale to several of the offshore renewable energy projects planned in the GAA. BOEM estimates the Proposed Action and other planned future projects will result in the development of 3,110 WTG and OSS foundations in the finfish GAA. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential biological significance of broader cumulative effects on finfish. cumulative effects could be beneficial or adverse, varying by species, and would likely range from **minor** to **moderate** adverse in terms of overall impact.			
Sediment deposition and burial	**Offshore:** While suspended sediment and burial effects are an unavoidable consequence of offshore wind energy construction, O&M, and decommissioning, these effects would be limited in extent and short term in duration, effectively ending once the sediments have resettled. Individual finfish could be adversely affected, but the number of individuals impacted and the duration of effects would be unlikely to adversely affect any finfish species at the population level at the scale of the GAA and would therefore be **minor** adverse.	**Offshore:** The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, burial effects on benthic eggs and larvae would be short term and expected to recover without remedial or mitigating action and therefore **minor** adverse. Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would therefore be **minor** adverse. Cumulative impacts would be more extensive and distributed across offshore WEAs within the GAA. However, these effects would be short term in duration and are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse.	**Offshore:** See Section 3.13.2.4.1 for construction impacts Cable protection maintenance would produce similar effects on finfish as those described for project construction, although reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance of benthic fauna and other finfish accustomed to naturally high rates of sediment deposition, to mortality of benthic eggs and fish subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column. The resulting adverse effects from O&M and decommissioning would therefore be **minor** adverse**.** Alternatives C through F would result in localized short-term **minor** adverse sediment deposition and burial effects on finfish. Short-term burial effects exceeding 10 mm would occur over an estimated 5,084 acres within the GAAs for finfish. Construction-related disturbance and suspended sediment effects would impact habitat and could disturb, injure, or kill finfish.			

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			Alternatives C through F in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described for the Proposed Action. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed. Impacts would be short term and would have a limited extent of significant burial effects relative to the amount of habitat available. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.**			
EFH						
Accidental releases and discharges	**Offshore:** Offshore wind energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the GAA. However, compliance with BOEM and USCG requirements would effectively minimize releases of trash and debris. Therefore, effects on EFH would be **negligible** adverse.	**Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of environmentally damaging trash or debris (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Given these restrictions, the risk to EFH species and habitats from trash and debris from the Proposed Action is **negligible** adverse. The Project would follow strict oil spill prevention and response procedures during all Project phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects to EFH species and their habitats could potentially result. BOEM estimates that the Project when combined with other offshore wind projects, would result in approximately 19 million gallons of coolants, fuel, oils and lubricants cumulatively stored within WTGs and OSSs within the water quality GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts.	**Offshore:** Similar to the Proposed Action, given the restrictions imposed by BOEM and the USCG, the risk to EFH from trash and debris from Alternatives C through F is negligible adverse. Moreover, Alternatives C through F would similarly include inspection of offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a **minor** beneficial effect on finfish. Similarly, the same strict oil spill prevention and response procedures would apply, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, minor to moderate adverse effects to EFH could potentially result. Alternatives C through F would slightly reduce total chemical uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the mid-Atlantic OCS overall. All future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. This would minimize, but not completely eliminate the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse cumulative effects would occur.			
Anchoring and new cable emplacement/ maintenance	**Offshore:** Offshore wind energy facility construction would involve direct disturbance of the seafloor bed leading to direct impacts on finfish. In general, these effects would be localized to the disturbance footprint and vicinity. The specific type and extent of habitat conversion and resulting effects on finfish would vary depending on the project design, species present, and site-specific conditions.	**Offshore:** Bed disturbance from various overlapping cable installation activities, including boulder relocation, sandwave leveling, jet plow trenching and dredging for cable installation, and placement of cable protection, could impact up to 3,451 acres distributed throughout the RWF and RWEC Maximum Work Areas. Additionally, 10% of cable protection could need to be replaced over the life of the Project. EFH within these construction footprints would be directly exposed to disturbance. On balance, these impacts would constitute a short-term adverse impact on EFH that would not result in measurable change in the overall extent of	**Offshore:** The potential impact to EFH related to crushing and burial during construction of Alternatives C through F would be the same or similar as those described for the Proposed Action and would have a **minor** adverse impact on EFH. Alternatives C through F would reduce the total length of IAC relative to the Proposed Action, meaning that the total amount of cable protection and maintenance-related impacts on EFH would decrease			

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	Therefore, the impacts from this disturbance on finfish would be **minor** adverse.	available EFH habitat within the Maximum Work Areas. Therefore, these impacts would be **minor** to **moderate** adverse. BOEM estimates a cumulative total of 5,850 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish and EFH GAA. When combined with other past, present, and reasonably foreseeable actions the Proposed Action would result in **moderate** adverse cumulative impacts.	commensurately. The resulting adverse effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction, O&M, and decommissioning and would therefore be **minor** adverse. Alternatives C through F would result in localized, minor to moderate impacts to EFH through seafloor disturbance from cable installation and vessel anchoring and mooring. The surface occupancy would noticeably reduce the cumulative impact acreage across Alternatives C through F relative to the Proposed Action, but the nature, duration, and general scope of effects would otherwise be similar. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts to EFH.			
Climate change	**Offshore:** Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These trends are expected to continue under the No Action Alternative. The intensity of impacts on EFH resulting from climate change are uncertain and will vary by species but on the whole are anticipated to be **moderate** adverse.	**Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would have a noticeable effect on GHG emissions. Regardless, climate change will likely result in **moderate** adverse cumulative impacts on EFH species and habitats.	**Offshore:** Climate change–related impacts to EFH under Alternatives C through F would be the same as those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts, are expected to continue. The intensity of climate change cumulative impacts on EFH is uncertain and is likely to vary considerably between species, resulting in **moderate** adverse effects regardless of the alternative selected. When combined with other past, present, and reasonably foreseeable actions, Alternatives C through F would have a noticeable effect on GHGs emissions. However, projected climate change impacts on EFH will likely remain **moderate** adverse regardless of the alternative selected.			
EMF	**Offshore:** Under the No Action Alternative, up to 10,024 miles of cable installation would be added in the GAA, producing EMF in the immediate vicinity of each cable during operations. Because measurable EMF effects are generally limited to within tens of feet of cable corridors, these future activities would not affect existing EMF conditions unless a transmission cable were routed directly through the GAA. Accordingly, EMF effects from future activities would most likely be **negligible** to **minor** adverse for HVAC, or **moderate** adverse if HVDC is used.	**Offshore:** The effects of EMF and associated substrate heating on EFH species and habitats would be the same as those described previously for finfish, wherein findings indicate that long-term EMF effects on EFH would likely be **minor** adverse along the majority of cable IAC, OSS-Line and RWEC length. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore be **minor** adverse for HVAC, or **moderate** adverse if HVDC is used.	**Offshore:** Alternatives C through F would result in similar EMF impacts on EFH to those described previously for the Proposed Action, but those impacts would be reduced in extent, and the total area exposed would vary depending on the configuration selected. Long-term EMF effects on EFH would likely be **minor** adverse along the majority of cable IAC, OSS-Line, and RWEC length. Alternatives C through F EMF effects would combine with those generated by the 10,024 miles of new and existing transmission cables from the other new offshore wind facilities planned on the mid-Atlantic OCS as well as other existing transmission cables. These cumulative effects would be similar in nature to those for the No Action Alternative but would occur over a larger area, as determined by the broader project footprint. Cumulative impacts to EFH would therefore be **minor** adverse for HVAC, or **moderate** adverse if HVDC is used.			
Noise	**Offshore:** Several proposed offshore wind projects could be developed on the mid-Atlantic OCS between 2022 to 2030, including	**Offshore:** The construction and installation of the RWF involves activities that would generate underwater noise exceeding established thresholds for mortality and permanent or short-term	**Offshore:** The construction and installation of Alternatives C through F would generate underwater noise exceeding established thresholds for			

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	some projects in proximity to the RWF (see Appendix E), resulting in noise-generating activities. As stated for finfish, BOEM believes it is reasonable to conclude that future projects could result in **negligible** to **moderate** adverse effects to EFH.	injury, TTS, and behavioral effects. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle but would be likely range from **minor** to **moderate** adverse. BOEM anticipates that underwater noise generated by operations of the WTGs and O&M-related vessels, as well as decommissioning, would result in effects considered **negligible** to **minor** adverse, based on the impacts described previously for finfish. However, the potential for more significant operational noise effects on EFH species such as cod is uncertain. Should such effects occur, they could result in long-term population-level effects that could be **major** in significance. Localized and short-term to permanent cumulative impacts from the Proposed Action would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **moderate** adverse effects on EFH.	mortality and permanent or short-term injury, TTS, and behavioral effects similar to those described for invertebrates and finfish. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle. The underwater noise effects would be the same or similar as those described above for finfish and would be likely range from **minor** to **moderate** adverse. Underwater noise effects on finfish resulting from O&M and decommissioning of Alternatives C through F would be similar in magnitude but reduced in extent relative to those described for the Proposed Action and therefore **negligible** to **minor** adverse, based on the impacts described previously for finfish. However, the potential for more significant operational noise effects on EFH species such as cod is uncertain. Should such effects occur, they could result in long-term population-level effects that could be **major** in significance. BOEM estimates that underwater noise from the construction of up to 16 other offshore wind facilities would result in short-term injury or behavioral effects on finfish over a cumulative area. Vessel noise from construction and installation, as well as O&M activities, could cause startle and avoidance responses in fish but would not cause injury. Periodic noise from O&M vessels and continuous or near-continuous WTG operational noise exceeding behavioral effects thresholds for fish would occur within a few hundred feet of each source. These effects would occur over the life of the Project through decommissioning. These localized and short-term to permanent cumulative impacts from Alternatives C through F would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **minor** adverse effects on EFH, finfish, and invertebrate species and their habitats. These impacts could be more significant, ranging from **moderate** to even **major** adverse, if they reduce EFH suitability for populations with a restricted range. However the likelihood of such effects is uncertain.			
Bycatch	**Offshore**: A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect EFH through direct sampling and the potential for bycatch and/or damage by sample collection gear. Research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts, although the distribution of those impacts could change. As	**Offshore:** Revolution Wind is proposing to implement the FRMP as part of the Proposed Action (Revolution Wind and Inspire Environmental 2021). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operations on selected invertebrate and finfish species and on benthic habitat structure and function. While the FRMP would result in unavoidable impacts to EFH species and their habitats, the extent of habitat disturbance and the number of organisms affected would be small in comparison to commercial and recreational fishing mortality and would not measurably impact the viability of any species at the population level. As such, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** cumulative effect on finfish.	**Offshore:** The effects to EFH from Alternatives C through F are anticipated to be the same as, or similar to, those described above for the Proposed Action.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	such, any bycatch related impacts on EFH would be **negligible** to **minor** adverse, and short term in duration.	These impacts would be offset by an improved understanding of the effects of offshore wind development on regional fish species and their habitats. This could in turn contribute to improved management of EFH species and their habitats.				
Presence of structures	**Offshore:** The future addition of up to 3,008 new WTG and OSS foundations on the mid-Atlantic OCS could result in hydrodynamic and artificial reef effects that influence finfish community structure within and in proximity to project footprints, resulting in effects that would be permanent and **moderate** beneficial for some species from habitat conversion and have **minor** adverse effects due to permanent habitat loss.	**Offshore:** The installation of 102 monopile foundations with associated scour protection would result in direct disturbance to EFH species and their habitats. The ongoing presence of monopiles, their foundations, and scour protection during Project O&M within the RWF and RWEC would create an artificial reef effect as well as hydrodynamic effects. The reef effect would alter biological community structure, producing an array of effects on EFH species. Those effects could be beneficial or adverse, varying by species. While localized effects are possible, ecosystem modeling studies of a European wind farm showed little difference in key food web indicators before and after construction and installation (Raoux et al. 2017). Thus, large-scale food web shifts are not expected due to the installation of WTGs and conversion of pelagic habitat to hard surface and would be expected to result in **negligible** to **minor** adverse or beneficial effects, varying by species. Hydrodynamic effects would influence primary and secondary productivity at local scales within and around this artificial reef, and dispersal patterns for the pelagic eggs and larvae of some fish and invertebrate species at larger scales across the northern Mid-Atlantic Bight. This could lead to negative, positive, or neutral effects on EFH species that rely on these dispersal patterns, varying by species. These effects would vary from **negligible** to **moderate** adverse in significance, varying by species. BOEM estimates the Proposed Action and other planned future projects would result in the development of 3,110 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish and EFH species and habitat. Effects could be beneficial or adverse, varying by species. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.	**Offshore:** Similar to the Proposed Action, Alternatives C through F would result in long-term alteration of water column and seafloor habitats due to structure presence, resulting in a diversity of effects on EFH. Monopile foundations and other hard surfaces installed would create the same type of habitat impacts and artificial reef effects, but those effects would be less extensive and distributed differently in comparison to the Proposed Action. Insufficient information is available to determine how the changes in Project configuration under Alternatives C through F could alter the extent and significance of potential hydrodynamic effects of EFH species and habitats. Alternatives C through F would include inspection offshore structures and removal of derelict fishing gear and other accumulated debris. This would provide a mechanism for removing potentially harmful marine debris from the environment. This would constitute a minor beneficial cumulative effect to EFH. BOEM estimates Alternatives C through F and other planned future projects would result in the development of 3,066 to 3,103 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish and EFH. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Sediment deposition and burial	**Offshore:** As previously noted, under the No Action Alternative, up to 10,024 miles of cable installation would be added in the GAA. These effects would be short term in duration, effectively ending once the sediments have resettled, resulting in short-term **minor** adverse effects on finfish.	**Offshore:** The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, however, sediment deposition and burial effects on EFH habitat would be short term and expected to recover without remedial or mitigating action and therefore would be **minor** adverse. Up to 10% of cable protection could be replaced over the life of the Project under the Proposed Action. Cable protection maintenance would produce similar effects on EFH species as those described for Project construction and installation, although reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would therefore be **minor** adverse. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.**	**Offshore:** Alternatives C through F would result in similar sediment deposition and burial impacts on EFH to those described for the Proposed Action, but those impacts would be reduced in extent, and the total area exposed would vary depending on the configuration selected. While this alternative would result in a slightly smaller area exposed to potential sediment deposition impacts, overall impacts would not change relative to the Proposed Action and would be **minor** adverse. Cable protection maintenance would produce similar **minor** adverse effects on EFH as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term sediment deposition and burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse**.**			

3.13.2.2 Alternative B: Impacts of the Proposed Action on Finfish

3.13.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: The impact to finfish from trash, debris, and spills from the Project would be the same as described under the No Action Alternative; **negligible** adverse.

In the unlikely event of a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects on finfish could potentially result. These effects could be short term to long term in duration depending on the type and volume of material released, the duration of exposure, and the animals and life stages exposed; fish eggs and larvae are less mobile and are considered more susceptible to spilled materials in surface waters (see Section 3.21.1.2).

Anchoring and new cable emplacement/maintenance: Finfish within the construction footprint would be exposed to risk of displacement, crushing, and burial during seafloor preparation of cable corridors, cable installation, placement of cable protection, and vessel anchoring. These activities would also impact benthic habitats used by certain finfish species, with the effects ranging in duration from short term to long term. The acres of construction-related bed disturbance are summarized by benthic habitat type in Section 3.6. As shown, bed disturbance from jack-up vessels and general vessel anchoring could impact up to 3,179 acres. Bed disturbance from various overlapping cable installation activities, including boulder relocation, sandwave leveling, jet plow trenching and dredging for cable installation, and placement of cable protection could impact up to 3,436 acres distributed throughout the RWF and RWEC Maximum Work Areas.

Finfish within these construction footprints would be directly exposed to disturbance. Juvenile and adult fish are mobile and would likely avoid being harmed or killed by construction equipment and materials placement. In contrast, certain fish species, such as cod, ocean pout (*Zoarces americanus*), pollock, and winter flounder, have benthic eggs and/or larvae that would be vulnerable to these effects. The extent of exposure would vary by species and habitat association. For example, ocean pout eggs are typically found in hard-bottom substrates, meaning that this species more likely to be exposed to boulder relocation and placement of scour and cable protection in large-grained complex and complex habitats. Winter flounder lay their eggs in soft-bottom benthic habitat, which translates to greater exposure to jet plow, sea-to-shore transition construction, and vessel anchoring in this habitat type. Approximately 69% of the estimated construction disturbance footprint is composed of soft-bottom habitat, 7% is large-grained complex habitat, and 24% is complex habitat ranging from boulders and cobbles to complex mixtures of mobile sand, gravel, cobble, and boulders.

Within the RWF, approximately 49% of an estimated 3,163 acres of anchoring impacts and 44% of an estimated 2,333 acres of IAC and OSS-link cable installation impacts would occur in large-grained complex or complex benthic habitat. The remaining 51% and 56% of impacts, respectively, would occur in soft-bottomed habitat. Impacts to large-grained complex and complex habitats would include sensitive areas on and around Cox Ledge that are known to support Atlantic cod spawning (BOEM 2021b). The combined 1,032 acres of impacts represents approximately 3.6% of the total combined acreage of mapped large-grained complex and complex benthic habitats within the RWF Maximum Work Area. Anchoring and cable emplacement activities during construction would therefore likely result in direct impacts on

larval, juvenile, and adult Atlantic cod associated with these habitats, as described above. Construction would also result in long-term to permanent impacts on the composition and structure of benthic habitats used by this species. The nature, duration, and severity of these impacts, including impacts to habitat-forming organisms, are discussed in Sections 3.6.2.2.1 and 3.6.2.3.1. While impacts to complex habitats would be long-term to permanent in duration, it is not clear that habitat suitability for species like cod would be substantially diminished over the same duration. For example, Wilber et al. (2022) observed an increase in Atlantic cod abundance at the BIWF compared to reference locations. Reubens et al. (2014) observed a similar increase in Atlantic cod abundance and documented the presence of settled larvae and juveniles exhibiting robust growth rates within a large European wind farm on the Baltic Sea. In both cases the observations occurred within a few years after construction was completed.

Jet plow operation and dredging used during cable installation would entrain and kill pelagic fish eggs and larvae that are near the equipment intakes during operation. While potential entrainment impacts have not been quantified for the Proposed Action, the findings of a recent analysis conducted for the adjacent SFWF provide a useful example of the magnitude of potential effects. Inspire Environmental (2019a) estimated that over a billion fish eggs could be exposed to entrainment impacts from installation of the SFEC and SFWF IAC, with exposure varying by species. For example, entrainment would kill an estimated 23,000 Atlantic cod larvae, a negligible number of haddock and pollock larvae, and up to 2.8 million Atlantic mackerel larvae. Given the similarity in location and greater scale of cable installation activities, the Proposed Action would likely produce similar or larger entrainment effects. However, these impacts must be placed into context with natural mortality to understand their significance. The total volume of water entrained during SFWF and SFEC construction (approximately 20 million cubic meters) represented a miniscule fraction of the billions of cubic meters of near-surface habitat on the mid-Atlantic OCS. A typical female cod lays over 1 million eggs (Alonso-Fernández et al. 2009), meaning that a spawning aggregation could produce hundreds of millions of eggs and larvae. The natural mortality rate is estimated to be 10% to 20% per day for cod eggs and 6% per day for larvae (Mountain et al. 2008). Mackerel are abundant, and each female can produce between 300,000 and 2 million planktonic eggs (Morse 1980). In this context, entrainment losses of tens of thousands of cod larvae or even several million mackerel eggs and larvae would be insignificant relative to the billions spawned in the region each year. While the Proposed Action is larger than the SFWF, and cable laying requirements are more extensive, impacts on finfish from jet plowing would be similar in scale and biologically insignificant relative to existing levels of abundance and the background mortality rate of fish eggs and larvae. On balance, entrainment of eggs and larvae would constitute a short-term adverse impact on finfish that would not result in measurable population-level impacts. Therefore, these impacts would be **minor** adverse.

Noise: Construction-related sources of noise and vibration that could affect finfish are impact and vibratory pile driving, preconstruction HRG surveys, vessel and dredging noise, and UXO detonation. Popper et al. (2014) compiled available research on underwater noise effects on fish and other aquatic life and established noise exposure thresholds for mortality, injury, and TTS in different species and life stages of fish based on sensitivity to sound. The Fisheries Hydroacoustic Working Group (FHWG) (2008) recommended a generalized threshold for behavioral effects on fish from noise exposure. These thresholds represent the current state of the science regarding potential noise effects on fish and are

presented in Table 3.13-3.[31] The low-frequency noise produced by construction and installation–related vessel engine noise could also cause auditory masking effects as those described below for WTG operations. However, these effects must be considered against the baseline levels of vessel traffic. Thousands of commercial and recreational vessel trips pass through the RI/MA WEA every year (see Section 3.16). Additionally, commercial and recreational fishing activity in and around the RWF likely generates hundreds of vessel trips and thousands of operational hours on an annual basis. In this context, construction and installation vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline. While construction and installation–related vessel noise could induce physiological stress responses or avoidance behaviors and could result in auditory masking of biologically significant sounds, BOEM anticipates that short-term exposure to vessel noise would not measurably alter normal behavior patterns.

Table 3.13-3. Noise Exposure Thresholds for Finfish Lethal Injury, Temporary Threshold Shift, and Behavioral Effects

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

Notes: N/A = not applicable.

* Thresholds from Popper et al. (2014).

† Values in dB re 1 µPa.

‡ Values in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second.

¥ Particle acceleration exposure threshold (Popper et al. 2014).

§ Threshold from FHWG (2008).

[31] The noise thresholds in Table 3.13-3 represent the best available science regarding finfish sensitivity to injury and behavioral-level effects from underwater noise exposure. No exposure thresholds have been defined for auditory masking effects in fish, but for the purpose of this Draft EIS, these effects are considered likely to occur at exposure levels between the behavioral threshold and the TTS threshold for each hearing group. NMFS applies different threshold criteria developed by the FHWG (2008) to evaluate underwater noise effects on ESA-listed species. The BOEM (2022a) BA for the Proposed Action uses these more conservative thresholds to evaluate potential underwater noise effects on Atlantic sturgeon, manta rays, and their prey and forage species.

Table 3.13-3 organizes fish into groups based on the presence of a swim bladder and the involvement of this organ in hearing. Noise impacts on fish vary depending on the ability of the fish to detect sound pressure. Popper et al. (2014) reviewed the available research and developed a set of recommended injury thresholds for different groups of fishes and invertebrates depending on their specific biological sensitivity to sound. Fish with a swim bladder or other gas chamber involved in hearing (e.g., Atlantic herring and fish in the cod family) are considered hearing specialists and are the most sensitive to underwater noise impacts. Fish that have a swim bladder that is not directly involved in hearing, or hearing generalists, are intermediate in sensitivity to noise impacts. Fish species that lack swim bladders and similar gas-filled organs (e.g., sharks, rays, and flatfish) are the least susceptible to underwater noise impacts. Eggs and larvae lack gas-filled organs and are less susceptible to injury but are unable to avoid noise impacts because they are less mobile than adults.

UXOs present in the Maximum Work Area would have to be detonated if they cannot be safely relocated prior to construction. Kusel et al. (2021) and Hannay and Zykov (2021) modeled construction noise likely to result from impact pile driving and UXO detonation and calculated the distances required to attenuate noise below applicable injury and behavioral criteria for each noise source by hearing group and type of effect (see Table 3.13-3).

As shown in Table 3.13-3, impact pile driving used to install the RWF monopile foundations is the most intense source of noise resulting from the Project and would produce the most significant and extensive noise effects on fish. As shown in Table 3.13-4, potentially lethal noise effects on adult fish occur from 604 to 5,883 feet from each WTG monopile and 617 to 5,194 feet from each OSS monopile. Potentially lethal effects on fish eggs and larvae could occur from 2,470 to 3,683 feet and 2,756–3,458 feet from each WTG and OSS monopile, respectively. Pile driving would produce noise above the 150 dB re 1 µPa behavioral effects threshold from 14,403 to 34,987 feet from each source, respectively. The range of threshold distances for injury from UXO detonation are for devices ranging in size from 5 to 1,000-pound devices, the latter being the largest explosive analyzed by Hannay and Zykov (2021). Detonation of 1,000-pound UXOs could injure or kill adult fish and fish eggs and larvae up to 951 and 1,384 feet from the source, respectively. Orsted anticipates that up to 13 UXOs ranging from 5 to 1,000 pounds in size may need to be detonated in place (LGL 2022). The actual number and location of UXOs is not currently known, but the largest devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021). The significance of these impacts will vary depending on when the impacts occur and proximity to important spawning habitats. While mortality-level effects on fish eggs and larvae could occur, these impacts are likely to be **minor** adverse overall because 1) the area of effect is small relative to the available habitat; 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae across the GAA, which can range from 1% to 10% per day or higher (White et al. 2014); and 3) construction timing along with development and adoption of an adaptive acoustic monitoring plan for Atlantic cod aggregations would be intended to avoid noise impacts in areas with Atlantic cod aggregations during the spawning periods.

Table 3.13-4. Distances to Underwater Noise Injury and Behavioral Thresholds by Fish Hearing Group and Exposure Type for Wind Turbine Generator and Offshore Substation Foundation Installation, Unexploded Ordnance Detonation, High-Resolution Geophysical Surveys, and Vessel Operation

Activity*	Number of Sites	Total Days	Noise Exposure Type	Hearing Group	Exposure Threshold†	Range of Threshold Distances (feet)‡
12-m WTG monopile foundation installation	100	33	Peak injury	Fish–Swim bladder involved in hearing	207	69–371
				Fish–Swim bladder not involved in hearing	207	69–371
				Fish–No swim bladder	213	13–59
				Eggs and larvae	207	69–371
			Cumulative Injury	Fish–Swim bladder involved in hearing	207	3,848–5,883
				Fish–Swim bladder not involved in hearing	210	2,470–3,638
				Fish–No swim bladder	219	604–856
				Eggs and larvae	210	2,470–3,638
			TTS	All fish	186	23,094–43,842
			Behavioral effects	All fish	150	14,403–34,987
15-m OSS monopile foundation installation	2	2	Peak injury	Fish–Swim bladder involved in hearing	207	125–299
				Fish–Swim bladder not involved in hearing	207	125–299
				Fish–No swim bladder	213	33-62
				Eggs and larvae	207	125–299
			Cumulative injury	Fish–Swim bladder involved in hearing	207	3,885–5,194
				Fish–Swim bladder not involved in hearing	210	2,756–3,458
				Fish–No swim bladder	219	617–797
				Eggs and larvae	210	2,756–3,458
			TTS	All fish	186	20,623–38,625
			Behavioral effects	All fish	150	15,157–35,722

Activity*	Number of Sites	Total Days	Noise Exposure Type	Hearing Group	Exposure Threshold†	Range of Threshold Distances (feet)‡
Temporary cofferdam installation	1	14	Behavioral effects	All fish	150	2,543
UXO detonation	13	13	Injury or mortality	All fish	229	161–951
				Eggs and larvae	>13	148–1,384
HRG surveys	10,755	248	TTS	All fish	186	16
			Behavioral effects	All fish	150	2,572
Construction vessel operation	N/A	~730	Behavioral effects	All fish	150	442

* Installation scenario for 12-m monopile is 6,500 strikes/pile at the installation rate of three piles/day. Installation scenario for 15-m monopile is 8,000 strikes/pile at the installation rate of one pile/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction. UXO detonation results assume a worst-case scenario requiring detonation of a 1,000-pound explosive device using a attenuation achieving 10 dB of sound source reduction. Total HRG survey impact area based on an estimated 10,775 linear miles of survey effort, or approximately 48 miles per day over 248 days at an average survey vessel speed of 2.2 knots.

† Peak injury thresholds are SPL in dB re 1 µPa; cumulative injury thresholds are SEL in decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second for 12 hours of exposure; behavioral injury threshold is SPL in dB re 1 µPa. The UXO detonation threshold for eggs and larvae is particle acceleration exceeding 13 millimeters per second.

‡ Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG and OSS values are the range of threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions. Orsted anticipates up to 13 UXOs requiring detonation in place could be encountered in the Maximum Work Area, with devices ranging in size from 5 to 1,000 pounds (LGL 2022). The low and high range of threshold distances shown are for detonation of for 5- and 1,000-pound UXOs, respectively, as modeled by Hannay and Zykov (2021). Detonation impacts could occur anywhere within the RWF and/or along the RWEC corridor, depending on where UXOs are identified.

Hearing generalist species have a swim bladder that is not directly involved in hearing. Species in this group may also use sound to communicate (Ladich and Schultz-Mirbach 2016; Popper et al. 2014). Examples of hearing generalists that occur in the RWF and RWEC include ocean pout, butterfish, scup, and tunas. While the presence of a swim bladder makes these species susceptible to sound-related injury, they are less vulnerable than the hearing specialists. Impact pile driving is the only source of construction noise likely to cause injury in this group, affecting individuals within approximately 2,470 to 3,683 feet and 2,756 to 3,458 feet of WTG and OSS monopile installation, respectively (see Table 3.13-4).

Fish that lack a swim bladder are the least vulnerable to noise impacts. While they have hearing organs and are susceptible to hearing injury, the lack of a swim bladder makes them less vulnerable to internal injuries leading to death (Popper et al. 2014). Examples of species in this hearing group that occur in the RWF and RWEC include flatfishes (e.g., summer, winter, and yellowtail flounder), skates (e.g., little, barndoor, and winter skate), and sharks (e.g., sand tiger, tiger, and sandbar shark). For this group, monopile installation is the only activity likely to cause injury-level noise effects from cumulative

exposure within approximately 604 to 856 feet and 617 to 797 feet of WTG and OSS monopile installation, respectively (see Table 3.13-4).

Fish eggs and larvae are potentially susceptible to injury and mortality from intense underwater noise. While available evidence is limited, Popper et al. (2014) defined injury criteria for eggs and larvae that are used in this EIS to evaluate potential effects on both fish and invertebrates (see Table 3.13-3). Impact pile driving and UXO detonation are the only construction noise sources likely to produce injury-level effects on eggs and larvae. This level of effect could occur within approximately 2,470 to 3,683 feet and 2,756 to 3,458 feet of WTG and OSS monopile installation, respectively, and within 148 to 1,384 feet of UXO detonations, depending on the size of the device. However, the extent and consequences of exposure are likely to vary. The instantaneous injury exposure area (area within which modeled underwater noise from a single monopile installation is above the injury threshold for fish eggs and larvae) is relatively small (within a few thousand feet of each site). Stationary eggs and larvae within this area would likely experience higher than natural levels of mortality. However, eggs and larvae that drift with the current would not remain in the exposure area for extended periods, and the additional impacts would not likely be significant relative to natural mortality rates on the order of 1% to 10% per day (White et al. 2014).

Noise impacts on fish are likely to vary by species depending on general sensitivity to sound and how noise impacts overlap with sensitive life stages. Meekan et al. (2021) found no significant impacts to population, community structure, behavior, or distribution of demersal finfish in response to experimental exposure to seismic survey noise. Although this effort studied a different fish community in western Australia, the results may be instructive here. The finding of no significant impact on fish population biology or community structure suggests that, for many fish species, noise impacts are likely to be short term and localized. Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment. Alteration of the ambient noise environment could interfere with this ability, leading to potentially significant effects varying by species.

For example, Atlantic cod, hake, and black sea bass belong to the hearing specialist group and rely on sound for communication and other important behaviors. Stanley et al. (2020) determined that noise from activities like impact pile driving could interfere with black sea bass communication during spawning but concluded that they would likely return to normal spawning behavior once the impact ceased. In contrast, other species such as Atlantic cod may be more sensitive to noise impacts. Atlantic cod are particularly sensitive to noise and other forms of disturbance during spawning, which can lead to longer term and more consequential effects. Atlantic cod rely on communication during spawning, using low-frequency grunts to locate potential mates and signal fertility (Rowe and Hutchings 2006). Cod may interrupt or abandon spawning altogether under conditions of intense disturbance (Andersson et al. 2017; Dean et al. 2012; Engås et al. 1996; Mueller-Blenke et al. 2010).

New scientific information indicates that the Atlantic cod that occur within in and around the RWF are a reproductively isolated population. As such, the potential for population-level effects from construction-related impact pile driving and other noise sources is an issue of particular concern. Historically, Atlantic cod have been managed in U.S. waters as two units: the Gulf of Main and the Georges Bank management units. Recently, an Atlantic Cod Stock Structure Working Group was formed and identified a number of

mismatches between the current management units and biological stock structure and proposed a new biological stock structure that accounts for inshore and offshore separation and spawn timing. McBride and Smedbol (2022) summarize several lines of evidence supporting the conclusion that the Atlantic cod found in the southern New England waters of the Mid-Atlantic Bight are one of five reproductively isolated spawning stocks that occur in U.S. waters. The southern New England stock spawns on and around Cox Ledge, within and in the vicinity of the RWF (Inspire Environmental 2019a, 2019b; BOEM 2021b). Cod display high spawning site fidelity, meaning that a spawning population will return to the same locations year after year (McBride and Smedbol 2022), and the cod that spawn within the RWF have demonstrated fidelity to this site over 3 consecutive years of monitoring (BOEM 2021b). This stock generally spawns twice per year, with spring spawning peaking in May–June and winter spawning peaking in November–December (McBride and Smedbol 2022), with the latter documented within the RWF (BOEM 2021b). Alteration of the ambient noise environment could interfere with communication and alter behavior in ways that could disrupt localized cod spawning aggregations (Dean et al. 2012; Rowe and Hutchings 2006), raising concerns about noise impacts from the Proposed Action. Monopile installation is the most extensive noise impact and the most likely to cause this potential effect. Impact pile driving would occur from May through December. BOEM has documented the presence of spawning Atlantic cod within and in proximity to the RWF in November and December (Inspire Environmental 2019b), indicating that pile driving could occur when maturing and mature spawning cod are present in the vicinity of the Maximum Work Area. Should such effects occur, they would constitute a moderate to potentially major adverse impact. Additional studies to more fully describe cod use of the habitats within and in proximity to the RWF are ongoing (BOEM 2021b). BOEM would require the applicant to prepare an acoustic monitoring and sound field verification plan and could require additional adaptive measures to avoid disrupting spawning aggregations of Atlantic cod.

Other hearing specialist species could be exposed to construction noise, but the consequences of exposure will vary depending on multiple factors. For example, monkfish spawn between May and December but do so over broad areas and likely multiple times per year (Johnson et al. 2008). Red hake spawn during summer, and the RWF and RWEC are located within a broader area identified as a hotspot for spawning and larval dispersal (Northeast Fisheries Science Center [NEFSC] 2020). However, unlike cod, this species spawns in the water column and does not associate with specific benthic habitats and therefore has less potential for direct noise exposure.

The potential for other construction noise sources, such as vessel engines and HRG surveys, to negatively impact cod and related species is less clear. While construction vessel noise (e.g., engine vibration, propeller cavitation) could occur during cod spawning in winter and early spring, vessel noise is lower in volume than impact pile-driving noise. As noted above, cod have continued to display high fidelity to spawning sites on Cox Ledge despite the ambient noise levels present in this environment. In this context, vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline. This suggests that any impacts on cod spawning could be limited in extent and duration and short term minor adverse with respect to HRG surveys and construction vessel noise.

As discussed in the No Action Alternative, construction of the Project could affect the Atlantic sturgeon and the giant manta ray, primarily through exposure to harmful levels of underwater noise during foundation installation as well as behavioral exposure from noise produced by preconstruction HRG surveys. NMFS uses different underwater noise impact criteria to assess potential underwater noise impacts on ESA-listed fish species (FHWG 2008). Adult and subadult endangered Atlantic sturgeon are

expected to occur in the offshore waters of the mid-Atlantic OCS throughout the year but appear to be present in lower numbers in the summer (Dunton et al. 2015; Ingram et al. 2019; Savoy and Pacileo 2003; Stein et al. 2004). This indicates that ESA-listed Atlantic sturgeon could be exposed to Project-related impacts noise impacts.

The most prominent impacts on Atlantic sturgeon are expected from exposure to pile-driving noise. Although individuals from the five DPSs of ESA-listed Atlantic sturgeon could be affected by the Proposed Action, which could include impacts up to and including injury or mortality. Individuals from these DPSs could be exposed to any of the effects described above on benthic habitats, finfish, and invertebrates that are pertinent to demersal fish species. Individual animals could be exposed to potential effects ranging from short-term behavioral disturbance to short-term or permanent hearing threshold shifts, to barotrauma injury or mortality from exposure to intense underwater noise from impact pile driving and UXO detonation. Most underwater noise impacts would be limited to short-term behavioral alteration.

In summary, Project construction is likely to result in short-term to long-term noise impacts sufficient to cause a range of effects on finfish. The significance of these effects are likely to vary by species, depending on the number of individuals exposed and the degree to which noise impacts might interfere with important biological functions like spawning. BOEM will require an adaptive management approach that will require the applicant to prepare an acoustic monitoring plan and, based on the monitoring, require the applicant to avoid activities that would disrupt spawning aggregations of Atlantic cod. Acoustic monitoring may restrict pile-driving activity during the cod spawning season to avoid and minimize adverse impacts on Atlantic cod spawning and reduce broader population-level effects. However, the adaptive approach has not been fully developed and the avoidance and minimization measures have not been implemented and tested. On balance, construction noise impacts on finfish would likely range from **minor** to **moderate** adverse. This is assuming the adaptive approach is successful in avoiding and minimizing impacts specific to Atlantic cod spawning.

Presence of structures: The impacts resulting from installed foundations would be similar to those described above in the anchoring and new cable placement/maintenance IPF. Juvenile and adult fish are mobile and would likely avoid being harmed or killed by construction equipment and materials placement. In contrast, certain fish species, such as cod, ocean pout, pollock, and winter flounder, have benthic eggs and/or larvae that would be vulnerable to these effects. The extent of exposure would vary by species and habitat association. Some individual finfish would unavoidably be injured or killed, but the number of individuals affected would be insignificant relative to the size of the population and the resource would recover completely without additional mitigation. Therefore, effects to finfish from construction of structures would be **negligible** adverse**.**

Sediment deposition and burial: The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Anticipated water column sediment concentrations and burial depths resulting from this impact mechanism are described in Table 3.6-8, Section 3.6.2.3.2. TSS concentrations of the magnitude and duration anticipated are below levels associated with measurable adverse effects on finfish (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). While sensitivity varies widely, the eggs and larvae of some species can be killed by as little as 0.4

inch (10 mm) of sediment deposition. The eggs of certain species, like winter flounder, are particularly sensitive and can be killed by burial depths less than 0.1 inch (3 mm) (Michel et al. 2013). While some adverse effects would undoubtedly occur, the extent of deposition and burial impacts is small relative to the amount of egg and larval settlement habitat available, and the duration of those impacts would be short term (hours to days). As described previously for larval entrainment, lethal burial of even several thousand eggs and larvae would be biologically insignificant relative to the number of eggs and larvae in the environment and natural mortality rates. Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, burial effects on benthic eggs and larvae would be short term and expected to recover without remedial or mitigating action and therefore **minor** adverse.

3.13.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: Potential impacts to finfish from accidental releases and discharges during O&M and decommissioning of the Project would be similar to and less than those described under construction and installation because the volumes of fuels and oils and number of vessels required during O&M and decommissioning would be less than that required during construction and operations (Section 3.21.2.2.2). As described for construction and installation, accidental releases that could occur during O&M and decommissioning would be infrequent and **negligible** adverse. In the unlikely event of a large accidental spill, impacts to finfish would similarly range from **minor** to **moderate** adverse depending on the size and timing of the event, the nature of the material evolved, the extent and duration of species exposure, and the necessary response measures used. As an example, Atlantic cod eggs float near the surface and are abundant in and near the RWF site from February to April (NEFMC 2017). A high-volume spill of toxic material that disperses on the water surface during this period could injure or kill large numbers of cod eggs, adversely affecting year class recruitment.

Anchoring and new cable emplacement/maintenance: As stated in Section 3.5.2 of the COP, the Project does not anticipate that the IAC, OSS-link cable, and RWEC would require routine maintenance. The cables themselves would be unlikely to require repair but up to 10% of cable protection could need to be replaced over the life of the Project. Cable repair and maintenance, replacement of scour protection, spill response, and other O&M activities could require vessel anchoring. Anchoring would result in short-term, localized impacts to benthic habitat similar to those described for Project construction but reduced in scale and dispersed over the operational life of the Project. Cable protection maintenance and the eventual decommissioning and removal of buried cables would produce similar effects on finfish as those described for Project construction in Section 3.13.2.2.1. These would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of finfish using these habitats. It is anticipated that these activities would result in short term **minor** adverse impacts to finfish.

EMF: Table 3.6-10 in Section 3.6.2.3.2 summarizes potential EMF and substrate heating exposure for benthic invertebrates from Project operations. Those findings are also applicable to demersal finfish. The EMF values displayed are the estimated maximum values that would occur at the seafloor directly over the cable. EMF strength would diminish rapidly with distance, becoming undetectable within

approximately 30 feet of the cable path (Exponent 2021). The most intense EMF effects would occur immediately above exposed RWEC segments laid on the bed surface and covered by an armoring blanket.

Hutchison et al. (2020b) reviewed available research on the sensitivity of various finfish species to EMF effects. They concluded that the available knowledge base on EMF effects on fish is insufficient to fully evaluate potential EMF effects from the widespread development of offshore renewable energy. Behavioral responses have been observed in some fish species exposed to EMFs, but clear relationships have yet to be established. Researchers studying EMF effects on fish have identified observable effects but usually at test exposures ranging from tens to hundreds of times greater than the strongest exposures likely to result from the Project. The type of power source is also an important factor. HVAC produces a different type of field effect from HVDC that may not be as detectable by electrosensitive fish species.

BOEM has evaluated the potential sensitivity of commercially and recreationally important fish species to likely EMF levels generated by commercial wind farm transmission cables on the OCS (Normandeau et al. 2011; CSA Ocean Sciences Inc. and Exponent 2019). CSA Ocean Sciences Inc. and Exponent (2019) determined that most fish species would not be able to detect EMF from HVAC transmission cables, and those species that are able to detect EMFs would not experience significant physiological or behavioral effects. All currently proposed offshore wind energy projects, including the Proposed Action, would employ HVAC transmission exclusively. These findings support the conclusions of Normandeau et al. (2011) that the magnetite-based sensory organs of fish are unable to detect AC magnetic fields below 50 mG. The minimum thresholds for observable physiological and behavioral effects in available research are much higher than the minimum detection threshold suggested by Normandeau et al. (2011), on the order of 250 to over 1,000 mG. A summary of applicable EMF effect thresholds from available research are summarized by species and life stage group in Table 3.13-5 and are applied here to evaluate potential EMF effects on finfish.

Table 3.13-5. Magnetic and Induced Electrical Field Levels Used to Evaluate Potential Electromagnetic Field Effects on Finfish

Species and Life Stage Group	Type of Effect	Magnetic Field	Induced Electrical Field (mV/m)	Source
Fish eggs and larvae	Survival and development	> 1,000 mG	> 500 mV/m	Brouard et al. 1996 Cameron et al. 1985
Finfish	Physiological and behavioral	> 950 mG	20 mV/m	Armstrong et al. 2015 Basov 1999 Bevelhimer et al. 2013 Orpwood et al. 2015
Sharks and skates	Behavioral	250–1,000 mG	< 2–5 mV/m*	Bedore and Kajiura 2013 Hutchison et al. 2020a Kempster et al. 2013

* This threshold only applies to induced electrical fields at frequencies below 20 Hz; the 60-Hz induced electrical field from the HVAC IAC and RWEC would likely not be detectable by sharks, skates, and rays (Bedore and Kajiura 2013).

The Project includes EPMs to minimize EMF impacts and would employ HVAC transmission, which generally produces lower intensity EMF than HVDC. All transmission cables would be contained in grounded metallic shielding to minimize electrical field effects and buried to target depths of 4 to 6 feet (1.2 to 1.8 m) in soft-bottom benthic habitat and other areas where burial is possible. Cable segments that cross unavoidable hard substrates and other offshore infrastructure would not be buried and would be laid on the bed surface covered with a concrete mattress or other form of cable armoring for further protection. EMF effects in these areas would be greater than for buried cable segments. The maximum possible magnetic field, directly adjacent to unburied sections of the RWEC (8.8 miles), is expected to be 1,071 mG, which diminishes to 91 mG at a distance of 3.3 feet (1 m) (see Table 3.6-10) (Exponent 2021). The magnitude of the earth's magnetic field in the GAA is approximately 516 mG, an order of magnitude higher than the magnetic field within a meter of the largest unburied cable (CSA Ocean Sciences Inc. and Exponent 2019). Rapid dissipation of EMF over distance therefore means that the effects are highly localized.

Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried and exposed electrical transmission cables on the surrounding environment. They determined that heat from exposed cable segments would dissipate rapidly without measurably heating the underlying sediments. In contrast, the typical HVAC cable buried in sand and mixed sand and mud (i.e., soft-bottom benthic habitat) can heat sediments within 1.3 to 2 feet (0.4 to 0.6 m) of the cable surface by +10 to 20°C. The anticipated extent of EMF and substrate heating effects from Project operations are the same as those summarized for benthic invertebrates in Section 3.6.2.3.2.

Substrate heating impacts generated by the IAC and RWEC are not likely to significantly affect finfish for the same reasons described for invertebrates in Section 3.6.2.3.2. Targeted research conducted by Hughes et al. (2015) and Emeana et al. (2016) indicate that substrate heating effects from buried cable segments at the minimum depths proposed for the Project are unlikely to be measurable within 2 feet of the bed surface. As such, these effects would not be detectable to fish on or burrowed into the bed surface at depths less than 2 feet. Substrate heating effects could reach the bed surface at transition points between buried and exposed cable segments. However, these transition areas and exposed cable segments would be covered by porous concrete mattresses or other forms of cable protection, limiting fish access. Small fishes using the interstitial spaces within the mattresses may be able to detect some cable heating effects, but only within the transition zones described.

These findings indicate that long-term EMF effects would likely be below detectable levels for finfish. Some electrosensitive species (such as sharks, skates, and rays) occurring in the immediate proximity of exposed cable segments may be able to detect EMF levels sufficient to alter their behavior, including inducing more rapid swimming, more frequent direction changes, and avoidance (Hutchison et al 2018). The exclusive use of 60 Hz AC in underwater transmission cables for offshore wind is not expected to induce significant behavioral responses in electrosensitive animals. Effects of this magnitude would occur within a few inches to feet of the cable surface, limiting these effects to a small number of individuals that occur near the cable surface. Given the short-term nature of these behavioral effects and the limited extent of exposure, effects to finfish are likely to be **minor** adverse.

Noise: The RWF would employ current generation direct drive WTG designs that generally produce less underwater noise and vibration than older generation WTGs with gearboxes. Much of our current understanding about operational noise is based on the monitoring of wind farms in Europe that use older

generation designs. Although useful for generally characterizing potential noise effects, these data are not necessarily representative of the noise produced by current generation designs (Elliot et al. 2019; Tougaard et al. 2020). Typical noise levels produced by older generation geared WTGs range from 110 to 130 re 1 µPa with 1/3-octave bands in the 12.5- to 500-Hz range, sometimes louder under extreme operating conditions (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020). More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects could be more intense and extensive than those considered herein, but additional research is needed.

Elliot et al. (2019) summarized findings of operational noise monitoring from the BIWF. The BIWF employs five 6-MW direct drive WTGs. Operational noise from the direct drive WTGs at the BIWF were generally lower than older, lower capacity WTGs at European wind farms. Operational noise levels typically ranged from 110 to 125 re 1 µPa, occasionally reaching as high as 128 re 1 µPa, mostly at low frequencies ranging from 10 Hz to 8 kHz. Particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. These values are considered usefully representative of the underwater noise effects likely to result from RWF operations.

Cod and other hearing specialist species are also potentially sensitive to particle motion effects. Elliot et al. (2019) compared observed particle motion effects at 164 feet (50 m) from an operational BIWF turbine foundation to current research on particle motion sensitivity in fish. They concluded that particle motion effects could occasionally exceed the lower limit of observed behavioral responses in Atlantic cod and flatfish within these limits. However, the documented use of complex habitats created by the structures by cod, black sea bass, and other hearing specialist species at the BIWF and European wind farms (Hutchison et al. 2020b; Methratta and Dardick 2019; Wilber et al. 2022) indicates that low-level operational noise effects are not causing avoidance responses in hearing specialist species. These observational studies are supported by experimental research. For example, Kastelein et al. (2008) observed no apparent behavioral changes in cod exposed to experimental sounds comparable to operational noise from WTGs within a contained environment. As stated previously (see Section 3.16.2.2.1), Atlantic cod are sensitive to changes in the ambient noise environment during spawning (Andersson et al. 2012; Dean et al. 2012; Engås et al. 1996; Mueller-Blenke et al. 2010; Rowe and Hutchings 2006). The low-frequency operational noise produced by WTGs overlaps the communication frequencies used by cod and other hearing specialist species like haddock (Stanley et al. 2017). This suggests that operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for these species and reduce reproductive success and future recruitment for species like cod and haddock. The likelihood and significance of these effects are unclear however and are likely to be species specific.

Revolution Wind (Tech Environmental 2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month, or 2,280 vessel trips over the life of the Project (see Section 3.15 for CTV and SOV operational noise details). Noise levels generated by the CTV are expected to be on the order of 160 dB re 1 $\mu Pa/sec^2$ at a reference distance of 1 meter based on observed noise levels generated by working commercial vessels of similar size and class to the CTVs (Kipple and Gabriele 2003; Takahashi et al. 2019). The SOV would produce similar noise levels to those described by Denes et al. (2021), on the order of 170 dB re 1 $\mu Pa/sec^2$. These values are below identified injury thresholds for all

fish and invertebrate hearing groups, indicating that CTV noise is unlikely to cause injury-level effects on any fish species. These values do exceed the 158-dB threshold for TTS effects on hearing specialist fish species, but this threshold assumes 24 hours of continuous exposure. An individual fish is unlikely to remain close enough to the moving vessel hull long enough for any risk of injury to occur. The 160 and 170 re 1 µPa/sec^2 source levels could exceed the behavioral effects threshold for fish in proximity to the vessels in some cases, but those effects would be short term in duration and limited in extent. The low-frequency noise produced by the vessel engine could also cause similar auditory masking effects as those described above for WTG operations. However, these effects must be considered against the baseline levels of vessel traffic. In this context, O&M vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline.

Additionally, the relatively low-intensity, low-frequency sounds produced by Project survey vessels are unlikely to result in direct injury, hearing impairment, or other trauma to marine fish. Vessel noise could induce physiological stress responses or avoidance behaviors and could result in auditory masking of biologically significant sounds. However, due to the expected brief periods of exposure to vessel noise, BOEM anticipates that short-term exposure to vessel noise would not measurably alter normal behavior patterns and would therefore be **negligible** adverse.

These findings indicate that measurable operational noise would result from the Proposed Action, producing effects detectable by finfish. Those effects are likely to vary in significance by species depending on hearing sensitivity. Effects on species that lack a swim bladder, like sharks, rays, and flatfish, and hearing generalist species like ocean pout, butterfish, scup, and tunas, are likely to be biologically insignificant and therefore **minor** adverse. In contrast, operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock, pollock, and hake, to communicate effectively within a few hundred feet of each turbine. The significance of these effects could range from **minor** to **moderate** adverse depending on how each species uses the affected area during periods when communication is important.

Decommissioning of the RWF and RWEC would lead to impacts similar to but less than those generated during construction because there would be no pile-driving impacts. During decommissioning, the monopile foundations would be cut below the bed surface using a cable saw. Pangerc et al. (2016) found that underwater noise levels produced by this type of equipment are difficult to distinguish from the associated construction vessel noise and are below levels that would cause injury or behavioral effects on fish. The impacts of short-term bed disturbance and water quality effects on fish would be similar to those caused by construction: **negligible** to **minor** adverse.

Presence of structures: The presence of monopile foundations and scour protection during Project O&M would create an artificial reef effect. The attractive effect of these artificial reefs on finfish is well documented (Degraer et al. 2020; Hutchison et al. 2020a; Kramer et al. 2015; Wilber et al. 2022). In a meta-analysis of studies on wind farm reef effects, Methratta and Dardick (2019) observed an increase in the abundance of epibenthic and demersal fish species, while effects on pelagic species are less clear (Floeter et al. 2017; Methratta and Dardick 2019). Increased fish abundance around wind farm structures can also attract predators like seals (Russel et al. 2014).

Hutchison et al. (2020b) and Wilber et al. (2022) documented a significant increase in the abundance of black sea bass, an EFH species, around the BIWF. This species is known to associate with complex

benthic habitat and artificial reef structures and is clearly benefiting from the habitat and foraging opportunities created by the artificial reef effect. Several other fish species have also been observed in abundance, including EFH species like Atlantic cod, scup, bluefish, monkfish, winter flounder, and dogfish (Hutchison et al. 2020b; Wilber et al. 2022). Atlantic striped bass and tautog, highly valued commercial and recreational fish species, have also been observed in abundance around the structures (Hutchison et al. 2020b; Wilber et al. 2022). Similar changes in fish community structure would likely occur at the RWF as the reef effect matures. Degraer et al. (2020) indicate that the finfish community around artificial structures differs significantly from the surrounding natural habitat, as would be expected with the introduction of vertical hard structure available to biogenic (e.g., bivalve) habitat formation. While this is a subject of ongoing inquiry, this indicates that although full recovery of complex benthic habitats damaged by Project construction could take a decade or more, those impacts could be offset over a shorter period of time by beneficial reef effects to other species (see Section 3.6).

The RWF is in the vicinity of, and overlaps Cox Ledge, an area of complex benthic habitat that supports several commercially and recreationally important species. The observations at the BIWF and other European wind farms (Hutchison et al. 2020a; Methratta and Dardick 2019) indicate that commercially valuable species like black sea bass, Atlantic cod, and pollock are likely to be attracted to the increased biological productivity these structures would create. While the available evidence to date suggests that the effects of long-term habitat alteration from wind farm development on finfish are generally beneficial at local and regional scales, considerable uncertainty remains about the potential for broader effects at population scales (Degraer et al. 2020). This could result in beneficial, neutral, or potentially negative effects. For example, increased feeding opportunities could translate to faster growth, increased fitness and survival, and increased reproductive success. Greater habitat productivity could also increase larval and juvenile survival within and around the affected habitats due to increased food availability and the protection offered by complex physical habitat. Wind farms could also create "ecological traps" that compel fish to remain in habitats that are unfavorable for spawning and larval survival (Degraer et al. 2020). The latter could also have negative consequences if vulnerable populations of fish are concentrated together with their predators and/or increased fishing effort. Habitat use of European wind farms by cod and pollock has largely been seasonal (Reubens et al. 2014), indicating that negative effects on migratory and spawning behavior is unlikely, at least for these species.

A principal concern raised about offshore wind development is how the presence of numerous WTGs could affect the circulation and stratification patterns that form the environmental conditions relied upon by finfish and other marine organisms. BOEM recognizes that the potential for negative impacts—referred to here as hydrodynamic effects—are a focus of interest for cooperating agencies and stakeholders considering the RWF and other planned and potential future projects in the region. Specific concerns include the potential for disruption of the circulation and stratification patterns that maintain the Mid-Atlantic Bight cold pool, the alteration of stratification patterns that support the base of the marine food web, and the potential for changes in circulation patterns to negatively affect the reproductive success of numerous fish and invertebrate species (Chen et al. 2016; Johnson et al. 2021).

Offshore wind farms can influence hydrodynamic conditions through two mechanisms: turbulent effects on mixing and stratification patterns caused by current flow around structures in the water column, and changes in surface wave and current patterns caused by wind field effects (i.e., the extraction of wind energy from the atmosphere) (Johnson et al. 2021; van Berkel et al. 2020). Van Berkel et al. (2020) reviewed observed hydrodynamic effects from European offshore wind farms and characterized how

these effects varied in significance in different oceanographic environments. Notably, van Berkel et al. (2020) observed that turbulent effects in environments having strong seasonal stratification were typically localized and less pronounced than those in other types of environments. Measurable effects on mixing and stratification patterns were typically limited to within 600 to 1,300 feet downcurrent of each monopile. In contrast, the combined wind field effects of a WTG array are typically more extensive, extending tens of miles downfield from the wind farm array (Johnson et al. 2021; van Berkel et al. 2020).

The northern Mid-Atlantic Bight is characterized by strong seasonal stratification that contributes to the formation of a seasonal oceanographic feature known as the cold pool (Chen 2018; Lentz 2017). The cold pool is a mass of relatively cool water that forms at depth in the shallow waters of the OCS in the spring and is maintained through the summer by stratification. The cold pool is regional in scale and supports a diversity of marine fish and invertebrate species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). The RWF is located on the approximate northern boundary of the cold pool.

As mentioned previously, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions northern Mid-Atlantic Bight (Johnson et al. 2021). This modeling study determined that the partial and full buildout scenarios considered would be unlikely to negatively affect, and may even strengthen, the stratification patterns that contribute to the formation and retention of the cold pool and food web productivity (Johnson et al. 2021). This predicted effect has been observed in long-term monitoring of wind farms in Europe (Floeter et al. 2017). The BOEM modeling results determined that small but measurable changes in current speed, wave height, and sediment transport would occur across the northern Mid-Atlantic Bight. As stated, these effects are of potential concern because they could change how the planktonic eggs and larvae of many marine species are dispersed across the region. Changing larval dispersal pathways can disrupt connectivity between populations and the processes of larval settlement and recruitment (Sinclair 1988). Unfavorable changes can create a “sink,” a condition where a reproductively isolated population is negatively affected by a prolonged reduction in larval survival (Sinclair 1988). This is a particular concern for species like Atlantic cod that return to the same spawning habitats year after year and rely on oceanographic conditions to disperse planktonic eggs to areas that provide favorable habitat conditions for larval and juvenile survival (Dean et al. 2022).

As stated, the weight of available evidence supports the conclusion that the cod that spawn on and around Cox Ledge belong to a reproductively isolated spawning stock (McBride and Smedbol 2022). BOEM acknowledges the concern that hydrodynamic impacts could potentially lead to negative population-level effects on this species. The BOEM modeling study evaluated potential hydrodynamic effects of wind energy development on egg and larval dispersal for several commercially valuable fish and invertebrate species. Johnson et al. (2021) found that the partial and full buildout of the RI/MA and MA WEAs would lead to localized changes in planktonic egg and larval dispersal patterns, with less extensive effects at lower levels of buildout. While this study did not consider Atlantic cod, the findings for other fish and invertebrate species are instructive. Johnson et al. (2021) determined that the larval dispersal patterns of each species, expressed as changes in predicted larval settlement density, would shift at scales of the order of miles to tens of miles. They concluded that these localized and effects are unlikely to be biologically significant at population levels for species like hake and scallops that spawn over broad areas across the

region (Johnson et al. 2021). However, source and sink effects could occur for species that spawn in specific areas and rely on dispersal of larvae to favorable habitats. These effects could be positive, negative, or neutral, varying by species and depending on specific project effects.

Degraer et al. (2020) commented that the future decommissioning of offshore wind facilities could become controversial if they are shown to support high-value fish species. While this potential is acknowledged, this EIS considers decommissioning as a component of the Proposed Action as required by BOEM for COP approval. Project decommissioning would remove the monopile foundations and scour and cable protection from the environment, reversing the artificial reef effect provided by these structures. Portions of the Project footprint, primarily along the RWEC corridor, would return to near pre-Project conditions, as influenced by ongoing environmental trends. As documented in Sections 3.6.2.3.2 and 3.6.2.4.2, benthic recovery is a complex process that involves both the reformation of benthic features, such as biogenic depressions and sand ripples, and recolonization of disturbed areas by habitat-forming invertebrates. Soft-bottom benthic habitats would likely recover to full habitat function within 18 to 24 months of disturbance while full recovery of habitat-forming organisms on complex benthic habitats could take a decade or longer. Individual fish species (e.g., small fish sheltering in epibenthic structure on the monopiles) could be injured or killed during removal. The fish community that formed around the reef effect would be dispersed, and individuals that are unable to locate new suitable habitats might not survive. While the significance of these future effects for individual finfish species is difficult to predict, measurable long-term impacts on some species are almost certain to occur. Impacts of this duration and magnitude would constitute a moderate adverse effect on finfish. Any population-level impacts would constitute a major adverse effect, but this level of impact on any finfish species is unlikely.

In summary, the potential effects to finfish resulting from the presence of structures are likely to vary by species. The available evidence suggests that some demersal fish species are likely to benefit from increased habitat structure and biological productivity while pelagic fishes may also benefit to a lesser extent. However, considerable uncertainty remains about the broader effects of this type of habitat alteration at population scales (Degraer et al. 2020). These effects could become more significant when combined with those from other planned offshore wind energy projects in the future. On this basis, habitat alteration on finfish resulting from the Proposed Action are expected to be long term in duration and **moderate** beneficial to **moderate** adverse in significance, varying by species. The hydrodynamic impacts of the Proposed Action could affect the productivity of finfish species that rely on planktonic dispersal of eggs and larvae. Localized shifts in larval settlement density are likely to occur; however, it is not clear that those shifts would measurably alter larval survival sufficiently to have a measurable effect at the population level. Changes in larval settlement patterns in the absence of population-level effects would constitute a **minor** to **moderate** impact on this resource, potentially positive or negative and again varying by species. In the case of reproductively isolated populations, such as southern New England Atlantic cod, hydrodynamic effects could be more significant should they result in prolonged negative changes in larval survival rates. The likelihood of such effects is uncertain but appears low, based on the scale of predicted changes in larval settlement density in comparison to the extent and distribution of suitable larval habitat for cod and other finfish species.

Sediment deposition and burial: Cable protection maintenance would produce similar effects on finfish as those described for Project construction, although reduced in extent and spread out over time. These effects would range from short-term behavioral disturbance and displacement of demersal and pelagic fish accustomed to naturally high rates of sediment deposition to injury and mortality of benthic eggs and

larvae subject to burial effects greater than 0.4 inch (10 mm). The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable from the seafloor would disturb sediments, releasing TSS into the water column. The resulting effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

3.13.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action in combination with other past, present, and reasonably foreseeable future activities could result in an increase in accidental releases of petroleum products and other toxic substances that could adversely affect finfish. As discussed in Section 3.21.2.2.3, BOEM estimates that the Project when combined with other future offshore wind projects would result in approximately 19 million gallons of coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the finfish GAA. All vessels associated with offshore wind projects would comply with USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and marine debris would be required of RWF Project personnel. Such releases would occur infrequently at discrete locations and vary widely in space and time. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **minor** to **moderate** adverse cumulative impacts on finfish ranging from short term to long term in duration.

Anchoring and new cable emplacement/maintenance: The Proposed Action would result in localized short-term minor adverse impacts to finfish through an estimated 7,150 acres of seafloor disturbance in the GAA. These actions would increase suspended sediment and potentially disturb, displace, or injure finfish, resulting in noticeable minor to moderate adverse impacts to finfish through an estimated 3,178 acres of general vessel anchoring and mooring-related disturbance and 4,009 acres of cabling-related seafloor disturbance. BOEM estimates a cumulative total of 5,850 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the finfish GAA. While the suspended sediment effects from this seafloor disturbance are not known, they are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments, although species inhabiting soft sediment habitats are generally adapted to episodic and localized increases in turbidity (such as during storms). When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in minor adverse impacts. Those impacts would combine with stressors from other ongoing activities and environmental trends, including commercial and recreational fishing, climate change, nearshore habitat degradation, and nonnative species invasions, which are likely to have minor to moderate adverse effects on finfish. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects and other stressors would result in **minor** to **moderate** adverse cumulative impacts to finfish.

Bycatch: The FRMP (Revolution Wind and Inspire Environmental 2021) to be implemented under the Proposed Action employs a variety of survey methods to evaluate the effect of RWF construction and

operations on benthic habitat structure and composition and economically valuable fish and invertebrate species. The survey methods in Table 3.13-6 either directly assess or could impact finfish.

Table 3.13-6. Survey Methods

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

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

The surveys would target specific invertebrate species using methods and equipment commonly employed in regional commercial fisheries. Finfish could be impacted if captured as bycatch or by being injured or killed when survey equipment contacts the seafloor. Non-target organisms would be returned to the environment where practicable, but some of these organisms would likely not survive. While the FRMP would result in unavoidable impacts to individual finfish, the extent of habitat disturbance and the number of organisms affected would be small in comparison to the baseline level of impacts from commercial fisheries and would not measurably impact the viability of any species at the population level. Randomized sampling distribution means that repeated disturbance of the same habitat is unlikely. As such, all habitat impacts from FRMP implementation would be short term in duration. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on finfish.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would be expected to help reduce climate change impacts over the life of the Project. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would have a noticeable effect on climate change, but climate change would continue to generate **moderate** adverse cumulative impacts on finfish.

EMF: The Proposed Action is not expected to produce significant EMF effects, as discussed in Section 3.13.2.2.2. BOEM anticipates that future offshore wind energy projects in the GAA would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. While uncertainties remain, future actions that produce EMF effects on the order of those generated by the Proposed Action are unlikely to have significant cumulative effects on finfish. Additive effects from multiple cables are likely to be limited to specific areas where cable routes cross. The Project's network of submarine cable (i.e., RWEC, IAC, and OSS-link cable) and cables from other planned and potential future projects could cross existing submarine assets, resulting in cables on the bed surface with

secondary protection. EMF levels sufficient to cause limited behavioral effects on finfish could occur in highly localized areas. These effects would be unlikely to significantly alter finfish behavior in ways that measurably affect any species at the population level. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would therefore result in **minor** adverse effects on finfish from exposure to detectable levels of EMF in limited areas for HVAC, or **moderate** adverse if HVDC is used.

Noise: The Proposed Action would result in noticeable short-term negligible to moderate adverse impacts to finfish through the generation of underwater noise during construction and installation. The Proposed Action would produce injury or behavioral-level noise effects on fish extending up to 38,625 feet from construction and installation–related impact pile-driving activities. These effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. BOEM estimates that underwater noise from the construction of other future offshore wind facilities would result in short-term injury or behavioral effects on finfish. Vessel noise from construction and installation, as well as O&M activities, could cause startle and avoidance responses in fish but would not cause injury. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **moderate** adverse.

The Proposed Action could affect the endangered Atlantic sturgeon in the same manner as the No Action Alternative, but no Atlantic sturgeon would be injured or killed. The most significant impact for individual Atlantic sturgeon would be underwater noise from pile driving; however, Project effects to individual Atlantic sturgeon would be limited to short-term minor adverse behavioral effects and disturbance that would be undetectable at population levels. For this reason, Proposed Action cumulative impacts when combined with past, present, and reasonably foreseeable future activities would also be **minor** adverse and not anticipated to result in adverse population-level consequences.

The Proposed Action and other planned and future offshore wind energy projects would include fisheries and benthic habitat monitoring plans to gather information about the effects of wind energy development on finfish and other marine resources. These activities would increase knowledge about finfish use of the mid-Atlantic OCS and the structure and composition of their habitats. This information could lead to improved management of finfish species and key habitats. This would constitute a **minor** beneficial cumulative effect on finfish resources.

Presence of structures: The Proposed Action would result in long-term alteration of water column and seafloor habitats, resulting in diverse effects on finfish. The monopile foundations and other hard surfaces installed as part of the Proposed Action would create an artificial reef effect. The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef. The reef effect would alter biological community structure, producing an array of effects on finfish, including several EFH species.

BOEM estimates the Proposed Action and other planned future projects would result in the development of 3,110 WTG and OSS foundations in the GAA for finfish that could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish resulting from the formation of multiple large-scale artificial reefs in the region and the biological hotspots they support.

As mentioned previously, BOEM conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. BOEM determined that small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight would occur. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. However, these localized and small effects are unlikely to be biologically significant at population levels (Johnson et al. 2021).

While modeled hydrodynamic effects from even the fully developed scenario considered by Johnson et al. (2021) are expected to be small in themselves, it is not clear how these effects would interact with the additional impact of the placement of artificial structures on finfish populations and communities. The expected shifts to fish community structure induced by the presence of a large number of artificial structures are likely to confound the projected hydrodynamic impacts. Collectively, these two modes of offshore wind development are likely to result in permanent and potentially significant impacts on larger scales. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on finfish could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.

Sediment deposition and burial: The Proposed Action in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described in Section 3.13.2.2.1. Impacts would be short term and would have limited significant burial effects relative to the amount of habitat available; therefore, burial effects on benthic eggs and larvae would be minor adverse. Cumulative impacts would be more extensive and distributed across the GAA. As stated, these effects would be short term in duration and would range in severity from negligible to minor adverse at any given location. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any finfish species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse.

3.13.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact finfish by causing short-term habitat disturbance; permanent habitat conversion; and behavioral changes, injury, and mortality of finfish. Effects to finfish resulting from the Proposed Action would vary by IPF and would vary depending on finfish exposure to those effects, individual habitat requirements, species, and life stage–specific sensitivity to Project-related impacts. Activities that primarily impact benthic habitat (i.e., cable installation, scour protection) are not as likely to impact species or life stages that depend on pelagic habitats. Conversely, the above-mentioned activities are likely to displace or kill benthic oriented fish species and life stages such as skates and flatfish as well as the eggs and larval stages of finfish. The continued presence of foundations could also affect pelagic habitat by leaving permanent vertical habitat that would host an altered community of benthic and associated demersal and pelagic organisms. The altered finfish community utilizing these artificial reef structures could persist beyond removal of the majority of the structures.

BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate** adverse, including the presence of structures, which could result in **moderate** beneficial impacts for some finfish. Overall, the impacts of Proposed Action alone on finfish would likely be **moderate** adverse. Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM

does not anticipate that these combined effects would alter the overall significance determination because they would not alter impacts on any species to such a degree that measurable population-level effects would occur.

The Proposed Action would be more likely to impact fish species having demersal- or benthic-oriented life stages than those that are more pelagic (i.e., water column) oriented, since the majority of Project activities impact the seafloor. However, pelagic species and life stages could be impacted by elevated suspended sediments, associated primarily with jet plow operation and dredging during cable installation. Jet plow entrainment would result in short-term impacts on pelagic eggs and larvae. Pile-driving noise, although short-term, could impact all benthic and pelagic life stages. The operational phase of the Proposed Action alone could lead to uncertain but possibly beneficial effects on many finfish species through reef effects. The adverse impacts associated with the construction and installation, O&M, and decommissioning of the Proposed Action alone are likely to be limited in temporal scope and/or small in proportion to the overall habitat available regionally.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts of individual IPFs under the Proposed Action would range from **negligible** to **moderate** adverse and **moderate** beneficial for some finfish. Applying the impact-level criteria in Section 3.3, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable offshore wind development activities and the effects of other ongoing activities and environmental trends would result in **moderate** adverse impacts on finfish in the GAA because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken. The main drivers for this impact rating are injury and mortality from construction-related noise impacts, long-term habitat changes resulting from the presence of structures, direct mortality and habitat disturbance associated with ongoing commercial and recreational fisheries, and climate change.

Revolution Wind has committed to implement EPMs to reduce potential impacts on benthic finfish resources (see Table F-1 in Appendix F).

3.13.2.3 Alternative B: Impacts of the Proposed Action on Essential Fish Habitat

3.13.2.3.1 Construction and Installation

Offshore Activities and Facilities

BOEM (2022b) has developed a detailed assessment of the potential effects on EFH resulting from construction of the Proposed Action. The following sections describe these impact mechanisms in detail and provide examples of their potential effects on representative invertebrate and finfish EFH species and their habitats. In general, effects on EFH resulting from the construction-related impact mechanisms would be similar in magnitude and extent to the effects on finfish described in Section 3.13.2, as well as the impacts to benthic habitat and invertebrates, as discussed in Section 3.6.

Accidental releases and discharges: Project compliance with discharge or disposal of solid debris into offshore waters would be as described in Section 3.13.2.2.1. Given these restrictions, the risk to EFH species and habitats from trash and debris from the Proposed Action is **negligible** adverse.

The Project would follow strict oil spill prevention and response procedures during all Project phases, effectively avoiding the risk of large-scale, environmentally damaging spills under reasonably foreseeable circumstances. In the unlikely event that a vessel collision or allision with a WTG or OSS foundation resulted in a high-volume spill, **minor** to **moderate** adverse effects to EFH species and their habitats could potentially result.

Anchoring and new cable emplacement/maintenance: For the installation of monopiles, it is assumed that approximately 31 acres would be temporarily disturbed from vessel anchoring for each of the 102 monopiles and an additional 21.1 overlapping acres would be disturbed by jack-up vessel anchoring, as well as 16.1 acres of pull-ahead anchoring during installation, for a total of 3,178 acres of short-term disturbance. Estimated area of short-term disturbance from anchoring would depend on the vessel and activity. The derrick barge crane vessel used during monopile installation could disturb 9.1 acres of seabed per monopile, due to placement of its 8-point 12-ton delta flipper anchor twice at each foundation. Vessels that utilize anchors (rather than spud cans) to hold position generally have a greater potential to disturb the seabed and result in crushing or burial impacts. Aside from monopile installation activities, vessels within the RWF work area would primarily use dynamic positioning systems to hold position and would not have any crushing or burial impacts.

Bed disturbance from various overlapping cable installation activities, including boulder relocation, sandwave leveling, jet plow trenching and dredging for cable installation, and placement of cable protection could impact up to 3,410 acres distributed throughout the RWF and RWEC Maximum Work Areas. EFH within these construction footprints would be directly exposed to disturbance. On balance, these impacts would constitute a short-term adverse impact on EFH that would not result in measurable change in the overall extent of available EFH habitat within the Maximum Work Areas. Therefore, these impacts would be **minor** adverse.

Noise: The construction and installation of the RWF involves activities that would generate underwater noise exceeding established thresholds for mortality and permanent or short-term injury, TTS, and behavioral effects. Underwater noise would render the affected habitats unsuitable for EFH species over the short term and could have short-term impacts on prey availability for EFH species. The extent, duration, and severity of noise effects on EFH would vary depending on the noise source and the sensitivity of the affected EFH species and their prey to noise impacts during their life cycle. The underwater noise effects would result from such Project activities as preconstruction HRG surveys, vessel and dredging activity, impact and vibratory pile driving, and UXO detonation and would be the same or similar as those described above for finfish and in Section 3.6 for benthic habitat and would likely range from **minor** to **moderate** adverse.

Presence of structures: The installation of 102 monopile foundations with associated scour protection would result in the same direct disturbance to EFH species and their habitats as described previously for finfish. Seafloor preparation for foundation installation would cover approximately 731 acres, approximately 19% in large-grained complex benthic habitat, 30% in complex habitat, and 51% in soft-bottom benthic habitat. EFH within the benthic disturbance footprints for foundation installation could be exposed to crushing and burial effects similar to those described previously for anchoring and new cable emplacement/maintenance.

While placement of the monopile foundations and scour protection are also elements of Project construction and installation, these features would remain in place throughout the operational life of the Project and would have long-term effects on EFH species and habitats. These long-term effects are therefore considered in Section 3.13.2.3.2.

Sediment deposition and burial: Sediment deposition and burial effects on EFH species would be similar to those described previously for finfish. The Project would result in short-term, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Anticipated water column sediment concentrations and burial depths resulting from this impact mechanism are shown in Table 3.6-8. TSS concentrations of the magnitude and duration anticipated are below levels associated with measurable adverse effects on finfish (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible adverse to EFH species. While some adverse effects would undoubtedly occur, the extent of deposition and burial impacts is small relative to the amount of EFH habitat available, and the duration of those impacts would be short term (hours to days). Given the short-term nature of the impact and the limited extent of significant burial effects relative to the amount of habitat available, sediment deposition and burial effects on EFH habitat would be short term and expected to recover without remedial or mitigating action and therefore would be **minor** adverse.

3.13.2.3.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

BOEM (2022b) has developed a detailed assessment of the potential effects on EFH resulting from the O&M of the Proposed Action. The following sections describe these impact mechanisms in detail and provide examples of their potential effects on representative invertebrate and finfish EFH species and their habitats.

Accidental releases and discharges: The prohibitions on releases of trash and debris and accidental spill avoidance and minimization measures described in Section 3.6.2.2.1 for Project construction would continue to apply throughout the operational life of the Project. These restrictions and measures would effectively avoid adverse effects from Project-related trash and debris and accidental spills during routine O&M activities. Therefore, the effects of this impact mechanism on EFH species and their habitats would be **negligible** adverse.

Anchoring and new cable emplacement/maintenance: Impacts to EFH species and habitats from the replacement of cable protection would be the same or similar to those described previously for finfish and benthic invertebrates and habitat. These would include direct disturbance of the seafloor, suspended sediment deposition in the surrounding area, and injury and displacement of finfish and benthic invertebrates using these habitats. It is anticipated that these activities would result in short-term **minor** adverse impacts to EFH species and their habitats.

EMF: The EMF and associated substrate heating effects anticipated to result from operations of the RWEC and IAC are summarized in Table 3.6-10 in Section 3.6.2.3.2. This table summarizes potential EMF and substrate heating exposure for benthic invertebrates. Those findings are also applicable to benthic-associated EFH invertebrates.

The effects of EMF and associated substrate heating on EFH species and habitats would be the same as those described previously for finfish in Section 3.13.2.2.2, wherein findings indicate that long-term EMF

effects on EFH would likely be **minor** adverse along the majority of cable IAC, OSS-Line, and RWEC length.

Noise: Operational noise is described in Section 3.13.2.2.2. Postconstruction HRG surveys could be conducted each year for the first 4 years of Project operations. This equates to approximately 25 days of HRG survey activity per year. The related effects on finfish would be similar in nature to those described for construction-related HRG surveys in Section 3.13.2.2.1 but reduced in extent and duration. The limited behavioral responses to HRG survey equipment and vessels would be similar to those described above for general O&M vessel noise.

While HRG survey noise would exceed the behavioral effects threshold over a larger cumulative area (3,352,996 acres), the continuously moving HRG vessels would distribute those impacts over approximately 10,755 linear miles and 248 days of survey effort. The instantaneous behavioral effects exposure area around the HRG equipment would be considerably smaller, approximately 477 acres.

BOEM anticipates that underwater noise generated by operations of the WTGs and O&M-related vessels, as well as decommissioning, would result in effects considered **negligible** to **minor** adverse for most species, based on the impacts described previously for finfish. As stated however, operational noise impacts on hearing specialist species, like Atlantic cod, haddock, pollock, and hake, could potentially be more significant, but sensitivity to these types of noise effects is uncertain. For example, Atlantic cod use sound to communicate during spawning, and the potential for operational noise to disrupt spawning behavior is a stated concern. The potential for and significance of these effects is currently unknown. Should such effects occur, they could range in severity from **moderate** to even **major** adverse depending on how each species uses the affected area during periods when communication is important.

Presence of structures: The artificial reef effect, as well as hydrodynamic effects, is discussed in Section 3.13.2.2.2. Foundations and scour protection would result in permanent effects on benthic and pelagic habitats on the mid-Atlantic OCS. The benthic habitat conversion impacts are summarized by category in Table 3.13-7.

Table 3.13-7. Habitat Conversion Impact Area by Habitat Complexity Category in Acres (hectares) by Revolution Wind Farm Project Feature and Habitat Type

Project Feature	Element	Large-Grained Complex	Complex	Soft Bottom	Total Benthic	Water Column (m^3)
100 39-foot (12-m) and two 49-foot (15-m) monopiles	Monopile foundation	0.6 (0.2)	1 (0.5)	1.5 (0.6)	3.1 (1.25)	408,211*
	Foundation protection†	15 (6)	23 (9)	43 (17)	78 (32)	N/A
	Seabed preparation	1,301 (527)	1,871 (757)	0	3,172 (1,284)	N/A
	Total	1,315.6 (533.2)	1,893 (766)	37.5 (15.6)	3,246.1 (1,314.65)	408,211*
Inter-array cable standard	Cable protection	30 (12)	44 (18)	0	74 (30)	N/A
	Seabed preparation	788 (319)	1,181 (478)	0	1,969 (797)	N/A
	Total	818 (331)	1,225 (496)	0	2,043 (827)	N/A
Inter-array cable standard +20% contingency	Cable protection	45 (18)	68 (28)	0	113 (46)	N/A
	Seabed preparation	922 (373)	1,383 (560)	0	2,305 (933)	N/A
	Total	967 (391)	2,051 (588)	0	3,024 (979)	N/A

Notes: N/A = not applicable.

* Based on WTG and monopile foundation diameter assuming an average depth of 35 m.

† Includes approximately 7.14 acres of cable protection system impacts extending beyond the scour protection footprint.

These benthic habitat impacts would be permanent. Similarly, impacts to pelagic habitat would result from the presence of the monopile foundations for the WTGs and OSSs. The installation of one-hundred-two 39-foot-diameter (12-m-diameter) monopile foundations would introduce approximately 12,000 to 16,000 m² of new hard surfaces to the water column, respectively, extending from the seabed to the water surface. These vertical structures would alter pelagic habitats used by EFH species and their prey and forage. Over time these new hard surfaces will become colonized by sessile organisms, creating complex habitats that effectively serve as artificial reefs. The artificial reef effect created by offshore structures like WTGs is well documented and can have an attractive effect on many marine species (Langhamer 2012; Peterson and Malm 2006; Reubens et al. 2013; Wilhelmsson et al. 2006). This can lead to localized increases in fish abundance and changes in community structure. The net effect of WTGs on pelagic EFH species and habitat is likely to be neutral to beneficial depending on species-specific responses, with the recognition that beneficial effects could be negated should these structures inadvertently promote the establishment of invasive species on the mid-Atlantic OCS.

In addition to reef effects, the hydrodynamic effects of the RWF could have localized effects on food web productivity and on the dispersal patterns of EFH species having pelagic eggs and larvae. As discussed in Section 3.13.2.2.2, reef and hydrodynamic effects on EFH species could be positive, negative, or neutral depending on a variety of factors. In theory, long-term hydrodynamic and reef effects could influence future changes to existing EFH and HAPC designations. For example, changes in egg and larval dispersal patterns caused by the hydrodynamic effects of the Proposed Action could affect the abundance and productivity of certain EFH species and change the importance of some habitats. Hydrodynamic effects could also lead to shifts in egg and larval dispersal patterns that change the importance of existing habitats. This could in turn lead to changes in HAPC designations to include new areas that are shown to provide productive habitat.

With regard to reef effects, the presence of offshore wind structures and the complex habitats they support are expected to effect EFH in ways that may be difficult to predict. The complex structure and biological productivity supported by reef effects been shown to attract and support increased abundance of many finfish and invertebrates, including EFH species, as well as their predators (see Sections 3.6.2.2.2 and 3.13.2.3.2). These changes are likely to lead to changes in food web dynamics. While localized effects are possible, ecosystem modeling studies of a European wind farm showed little difference in key food web indicators before and after construction and installation (Raoux et al. 2017). Even though the biomass of certain taxa increased in proximity to the wind farm, trophic group structure was functionally similar between the before and after scenarios. Thus, regional-scale changes in food web dynamics are not anticipated.

On balance, the presence of structures is likely to result in a range of effects on EFH species and habitats. Those effects could be **minor** to **moderate** in significance and adverse, beneficial, or neutral, and would vary by species depending on individual habitat requirements.

Sediment deposition and burial: Cable protection maintenance would produce similar effects on EFH species as those described for Project construction and installation, although reduced in extent and spread out over time. The resulting effects from O&M and decommissioning would be similar in nature but lesser in magnitude than those resulting from Project construction and would therefore be **minor** adverse.

3.13.2.3.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: Section 13.2.2.3 estimates potential coolants, fuel, oils, and lubricants cumulatively stored within WTGs and OSSs within the EFH GAA and discusses measures that would be implemented to prevent and control oil and fuel spills. Based on that analysis, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts on EFH ranging from short term to long term in duration.

Anchoring and new cable emplacement/maintenance: Section 13.2.2.3 estimates Proposed Action and cumulative cabling-related disturbance within the EFH GAA. The Proposed Action would increase suspended sediment and potentially disturb, displace, or injure individual EFH species, resulting in localized **minor** to **moderate** adverse impacts. Cumulatively, while the suspended sediment effects from this seafloor disturbance are not known, they are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. Some projects could also include dredging for O&M facility development or related port improvements, which could contribute to suspended sediment and deposition effects. When combined with other past, present, and reasonably foreseeable actions the Proposed Action would result in **moderate** adverse cumulative impacts.

Bycatch: EFH impacts due to bycatch would be as discussed in Section 3.13.2.2.3. The intensity and duration of impacts anticipated from FRMP implementation would constitute a **minor** adverse cumulative effect on EFH. These impacts would be offset by an improved understanding of the effects of offshore wind development on regional fish species and their habitats. This could in turn contribute to improved management of EFH species and their habitats.

Climate change: EFH impacts due to climate change would be as discussed in Section 3.13.2.2.3. Climate change would result in **moderate** adverse cumulative impacts even when the offsetting effects of the Proposed Action are combined with those from other past, present, and reasonably foreseeable projects.

EMF: The Proposed Action is not expected to produce significant EMF effects, as discussed in 3.13.2.2.3. Cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would be **minor** adverse for HVAC, or **moderate** adverse if HVDC is used.

Noise: The Proposed Action would result in noticeable short-term **negligible** to **moderate** adverse impacts to EFH species and their habitat through the generation of underwater noise during construction and installation, as described in Section 3.13.2.2.3. The Proposed Action would produce injury or behavioral-level noise effects on fish extending up to 39,380 feet from construction and installation–related impact pile-driving activities. Periodic noise from O&M vessels and continuous or near-continuous WTG operational noise exceeding behavioral effects thresholds for EFH species would occur within a few hundred feet of each source. These effects would occur over the life of the Project through decommissioning. These localized and short-term to permanent cumulative impacts from the Proposed Action would combine with similar localized impacts from other past, present, and reasonably foreseeable activities, resulting in **negligible** to **moderate** adverse effects on EFH.

Presence of structures: Cumulative to EFH, expressed in terms of effects on benthic habitat, invertebrates, and finfish and their habitats are described in Sections 3.6.2.2.3, 3.6.2.3.3, and 3.13.2.2.3, respectively.

BOEM estimates the Proposed Action and other planned future projects would result in the development of 3,110 WTG and OSS foundations in the EFH GAA. Depending on how these are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on EFH species and habitat. Collectively, cumulative impacts from the combined reef and hydrodynamic effects of multiple offshore wind energy projects on EFH could be positive or negative, varying by species, and would likely range from **moderate** adverse to **moderate** beneficial in significance, varying by species.

Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** beneficial cumulative effects on EFH species from removal of derelict fishing gear and marine debris.

Sediment deposition and burial: The Proposed Action in combination with future offshore wind projects would generate similar sediment deposition and burial effects to those described in Section 3.13.2.2.3. As stated, these effects would be short term in duration. Cumulative short-term impacts from all planned and future projects are not likely to have measurable population-level effects on any EFH species; therefore, cumulative effects from sediment deposition and burial would be **minor** adverse.

3.13.2.3.4 Conclusions

Over 40 species of finfish and invertebrates with designated EFH and HAPC occur within the RWF Lease Area and the RWEC project easement. The Proposed Action includes construction and installation, O&M, and decommissioning of the Project components. Project decommissioning would occur at the end of the 35-year operating period of the Project and would be subject to a separate EFH consultation at that time.

Project construction and installation would result in short-term adverse effects on the environment that could affect habitat suitability for managed species. Short-term adverse effects include construction and installation–related underwater noise impacts; crushing, burial, and entrainment effects; and disturbance of bottom substrates resulting in increased turbidity and sedimentation. These effects would occur intermittently at varying locations in the RWF Lease Area and the RWEC project easement over the duration of Project construction and installation but are not expected to cause permanent effects on EFH habitat quality. Depending on the nature, extent, and severity of each effect, this may temporarily reduce the suitability of EFH habitat for managed species, which would result in short-term adverse effects on EFH habitat for those species. For example, underwater noise from pile driving could temporarily render the affected habitats unsuitable as EFH habitat for multiple life stages of Atlantic cod and longfin squid. However, EPMs such as sound attenuation and soft start procedures could minimize such acoustic impacts.

The O&M of the RWF, RWEC, and O&M facility would result in intermediate to long-term adverse effects on EFH habitat for some life stages of EFH species. Long-term adverse effects are those that would last over the approximately 35-year operating period of the Project, so would be effectively permanent. These impacts include alteration of water column and benthic habitats, operational noise,

EMF and heat effects, hydrodynamic effects, and food web effects. Monopile foundations, scour protection, and cable protection would alter habitat. Benthic habitat areas mapped within the Lease Area consist of 17,945 acres (7,062 hectares) of complex, 11,128 acres (4,503 hectares) of large-grained complex, and 29,563 acres (23,529 hectares) of soft-bottom benthic habitat. Foundation piles would displace approximately 1.54 acres (0.61 hectare) of complex, 0.1 acre (0.05 hectare) of large-grained complex, and 1.44 acres (0.62 hectare) of soft-bottom benthic habitat within the footprint of the one hundred 39-foot (12-m) WTG monopiles and two 49-foot (15-m) OSS monopiles. An additional estimated 34 acres (14 hectares) of complex, 1 acre (0.4 hectare) of large-grained complex, and 36 acres (15 hectares) of soft-bottom benthic habitat would be modified by placement of scour protection around the foundations and IAC approaches. Approximately 44 acres (18 hectares) of complex and 30 acres (12 hectares) of large-grained complex benthic habitat would be modified by placement of secondary cable protection along approximately 19.5% of the IACs anticipated to be surface-laid. The potential increase in abundance of epibenthic and demersal fishes resulting from the reef effect may offset some impacts to EFH of those species over the life of the Project, although it may take a decade or more for the reef effect to fully develop. Analyses of habitat impacts are found in Section 5. The implementation of EPMs would likely result in the avoidance and minimization of some of the intermediate to long-term (permanent) Project impacts to EFH species and their habitat described above. Overall, the construction and installation, O&M, and decommissioning of the Project would be expected to result in effects that range from **moderate** adverse to **moderate** beneficial (O&M, presence of structures) to **negligible** to **minor** adverse (for HVAC) and **moderate** adverse (for HVDC).

3.13.2.4 Alternatives C, D, E, and F: Finfish

3.13.2.4.1 Construction and Installation

Offshore Activities and Facilities

Noise: Alternatives C through F would result in similar noise impacts to finfish from WTG and OSS foundation installation to those described in Section 3.13.2.2.1 for the Proposed Action, but the duration and extent of those impacts would be reduced. These impacts would vary based on the reduced number of WTGs and/or OSS foundations installed under each alternative, depending on the configuration selected. Reducing the number of structures could also reduce the required extent of HRG surveys under each alternative relative to the Proposed Action, but BOEM has insufficient information to determine if this is the case. Similarly, it is not possible to determine if changes in foundation layout would alter the UXO detonation requirements relative to the Proposed Action because the probable area of occurrence within the RWF is large and centrally located within the wind farm footprint. Therefore, impacts to marine mammals from HRG surveys and UXO detonation are considered to be the same across all alternatives.

Differences in underwater noise impacts on finfish between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Table 3.13-8, Table 3.13-9, and Table 3.13-10, respectively. These tables display the differences in the number of impact pile-driving sites and the estimated total duration of potentially harmful noise effects from pile-driving activities. While the alternatives would vary in terms of the number of impact pile-driving sites and total duration of pile-driving activities, the magnitude of impacts and general scale of effects would be similar to those under the Proposed Action.

Impact pile driving used to install the RWF monopile foundations is the most intense source of noise resulting from the Project and would produce the most significant and extensive noise effects on fish. Pile-driving noise would exceed the cumulative injury 354- to 2,749-foot behavioral effects thresholds for finfish from 354- to 2,749-foot and nearly 35,000 feet (6.6 miles) from each foundation installation, respectively. These effects would occur at 64 to 93 sites for 22 to 31 days under Alternatives C through F, varying by the alternative configuration selected. While the extent and duration of effects would vary between alternatives, the level of impact would be similar. Therefore, construction noise effects on finfish resulting from Alternatives C through F would be the same as those under the Proposed Action, ranging from **negligible** to **minor** adverse.

Similar impacts as described for the Proposed Action for intermittent non-impulsive noise associated with vibratory pile driving, HRG surveys, and construction vessels would result from Alternatives C through F and would have a **negligible** to **minor** adverse impact. Potential effects to ESA-listed Atlantic sturgeon and giant manta ray under Alternatives C through F would be similar in intensity as those described for the Proposed Action but reduced in extent and therefore **negligible** to **minor** adverse.

Sediment deposition and burial: Alternatives C through F would result in similar sediment deposition and burial impacts on finfish to those described in Section 3.13.2.3.1 for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the configuration selected. Differences in potential sediment deposition and burial exposure between the Proposed Action and the different configurations proposed for Alternatives C, D, and E are summarized in Table 3.6-23, Table 3.6-24, and Table 3.6-25 in Section 3.6.2.5.1, respectively, in terms of the estimated total acres exposed to sediment deposition and burial effects greater than 0.4 inch (10 mm) for each cable component.

Table 3.13-8. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm Wind Turbine Generator Foundation Installation, the Proposed Action, and Proposed Configurations for the Habitat Alternative*

Noise Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action (number of sites/days)	C1 (number of sites/days)	C2 (number of sites/days)
Peak injury	Fish–Swim bladder involved in hearing	348	100 sites/ 35 days	64 sites/ 22 days	65 sites/ 22 days
	Fish–Swim bladder not involved in hearing	348			
	Fish–No swim bladder	59			
	Eggs and larvae	348			
Cumulative injury	Fish–Swim bladder involved in hearing	2,749			
	Fish–Swim bladder not involved in hearing	1,680			
	Fish–No swim bladder	354			
	Eggs and larvae	1,680			
TTS	All fish	30,961			
Behavioral effects	All fish	34,987			

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

Table 3.13-9. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm WTG Foundation Installation, the Proposed Action, and Proposed Configurations for the Transit Alternative*

Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action (number of sites/days)	D1 (number of sites/days)	D2 (number of sites/days)	D3 (number of sites/days)	D1+D2 (number of sites/days)	D1+D3 (number of sites/days)	D2+D3 (number of sites/days)	D1+D2+D3 (number of sites/days)
Peak injury	Fish–Swim bladder involved in hearing	348	100 sites/ 35 days	93 sites/ 31 days	92 sites/ 31 days	93 sites/ 31 days	85 sites/ 28 days	86 sites/ 29 days	85 sites/ 28 days	78 sites/ 26 days
	Fish–Swim bladder not involved in hearing	348								
	Fish–No swim bladder	59								
	Eggs and larvae	348								
Cumulative Injury	Fish–Swim bladder involved in hearing	2,749								
	Fish–Swim bladder not involved in hearing	1,680								
	Fish–No swim bladder	354								
	Eggs and larvae	1,680								
TTS	All fish	30,961								
Behavioral effects	All fish	34,987								

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

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Table 3.13-10. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration by Fish Hearing Group from Revolution Wind Farm Wind Turbine Generator Foundation Installation and Unexploded Ordnance Detonation, the Proposed Action, and Proposed Configurations for the Viewshed Alternative*

Noise Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action (number of sites/days)	E1 (number of sites/days)	E2 (number of sites/days)
Peak injury	Fish–Swim bladder involved in hearing	348	100 sites/ 35 days	64 sites/ 22 days	81 sites/ 27 days
	Fish–Swim bladder not involved in hearing	348			
	Fish–No swim bladder	59			
	Eggs and larvae	348			
Cumulative Injury	Fish–Swim bladder involved in hearing	2,749			
	Fish–Swim bladder not involved in hearing	1,680			
	Fish–No swim bladder	354			
	Eggs and larvae	1,680			
TTS	All fish	30,961			
Behavioral effects	All fish	34,987			

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

The various configurations of Alternatives C through F would modify the installation length for the IAC. This would reduce the extent of sediment deposition and burial effects for IAC installation relative to the Proposed Action. The Habitat Alternative would also alter the distribution of sediment deposition impacts by avoiding large blocks of complex and large-grained complex habitat, meaning that finfish associated with those habitats would be less likely to experience deposition effects. Alternatives C through F would not change the proposed configurations of the OSS-link cable and RWEC; therefore, sediment deposition and burial effects for these Project components would not change. While this alternative would result in a slightly smaller area exposed to potentially harmful sediment deposition impacts, overall impacts would not change relative to the Proposed Action and would range from **negligible** to **minor** adverse.

3.13.2.4.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Presence of structures: As discussed for benthic habitat in Section 3.6.2.4.2, Alternatives C through F would result in the installation of fewer monopile foundations than the Proposed Action and would reduce the total length of IAC. This would noticeably reduce the extent of long-term to permanent impacts on finfish, particularly those species that associate with benthic habitats within the RWF Maximum Work Area.

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

Alternatives C through F would produce reef and hydrodynamic effects from structure presence similar in nature but reduced in extent relative to those described for the Proposed Action in Section 3.6.2.3.2. The resulting effects on finfish, invertebrates, and other organisms would be reduced in extent under each alternative configuration commensurate with the number of structures and acres of cable protection installed (see Table 3.6-14, Table 3.6-15, and Table 3.6-16 for Alternatives C through E) but would be of the same general scale and overall impact as those produced by the Proposed Action. These effects would therefore range from **minor** to **moderate** adverse or **moderate** beneficial, as measured by potential effects on the broader biological community associated with benthic habitats using the significance criteria defined in Section 3.3, Table 3.3-2.

As discussed for Project construction, these impact determinations do not differentiate potentially important differences in impacts between alternatives. Specifically, the proposed configurations of Alternative C were specifically selected to avoid and minimize impacts to large-grained complex and complex habitats of value for certain fish species of concern. This would in turn reduce the extent of impacts for species, such as Atlantic cod, that associate with specific complex benthic habitats on Cox Ledge within the proposed RWF footprint. As discussed in Section 3.13.2.3.2, the Proposed Action is likely to result in complex reef and hydrodynamic effects that could influence habitat conditions for a

variety of finfish species that occur in the region. Many of these effects are uncertain and could be positive, negative, or neutral depending on the fish species in question and the alternative-specific nature of the effects. For example, the hydrodynamic effects of the Proposed Action are likely to have noticeable effects on the dispersal patterns of silver hake eggs and larvae (Johnson et al. 2021). However, the resulting localized shifts in larval settlement density are likely to be biologically insignificant given that this species spawns in large aggregations and disperses larvae over broad areas at regional scales (Johnson et al. 2021). In contrast, changes in egg and larvae dispersal patterns could be more significant for species like Atlantic cod that spawn in specific areas and rely on the conditions present to carry their pelagic eggs and larvae to areas that are favorable for survival and recruitment. While hydrodynamic effects could lead to localized shifts in larval settlement density, it is not currently known if this would have any measurable effects on larval survival or population productivity. Therefore, while Alternatives C through F would reduce hydrodynamic effects by varying degrees relative to the Proposed Action, it is not possible to determine if this would result in measurable differences between alternatives in impacts to finfish.

3.13.2.4.3 Conclusions

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

3.13.2.5 Alternatives C, D, E, and F: Essential Fish Habitat

Table 3.13-1 provides a comparison of all evaluated IPFs for EFH across alternatives.

3.13.2.5.1 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact EFH through the same mechanisms described for the Proposed Action, including short-term and long-term habitat disturbance, permanent habitat conversion, and changes in substrate composition and nutrient cycling from reef effects caused by structures. Overall the construction and installation, O&M, and decommission of Alternatives C through F would be expected to result in effects that are similar to the Proposed Action and range from **negligible** beneficial (O&M, presence of structures) to **moderate** adverse.

3.13.2.6 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix F, Table F-2 and addressed here in more detail (Table 3.13-11).

Table 3.13-11. Proposed Mitigation Measures – Finfish and Essential Fish Habitat

Mitigation Measure	Description	Effect
Marine debris awareness training	Revolution Wind would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Marine debris elimination	Materials, equipment, tools, containers, and other items used in OCS activities which are of such shape or properly secured to prevent loss overboard shall be marked identifying the owner.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Anchoring plan	BOEM would require Revolution Wind to develop an anchoring plan to avoid or minimize adverse impacts on benthic habitat during Project construction and from O&M activities throughout the life of the Project.	The anchoring plan would delineate sensitive large-grained complex and complex habitats, including eelgrass and kelp beds, and identify areas where anchoring activities are restricted. The anchoring plan would effectively minimize long-term impacts to large-grained complex and complex habitats, limiting the extent of long-term impacts on habitat-forming invertebrates and benthic habitat structure. While anchoring impacts to finfish and EFH would remain **minor** adverse overall, the duration of most impacts would be reduced to short term as the majority would occur in soft-bottomed habitats.
Scour and cable protection	Revolution Wind would be required to use natural rounded stone for cable and scour protection within large-grained complex and complex habitats and avoid use of concrete mattresses where practicable. The selected materials should be designed and placed restore three-dimensional structural complexity.	This would reduce impacts on benthic habitat composition and structural complexity and, in the case of cable protection, reduce the time required for colonization by habitat-forming organisms. This would beneficially reduce the severity and duration of impacts to finfish and EFH from presence of structures. While long-term impacts from these structures would remain same, moderate adverse to moderate beneficial, the time required to achieve moderate beneficial effects would decrease.

Mitigation Measure	Description	Effect
Post-installation cable monitoring	Revolution Wind would be required to inspect all cables after construction is completed to document exact location, burial depth, and post-installation benthic habitat conditions. Inspections would be completed within 6 months of Project commissioning, annually for the first 3 years following construction and as needed following major storm events. Monitoring reports would be submitted to BOEM within 45 days of survey completion.	This measure would not modify the impact determination for new cable emplacement effects on finfish or EFH (minor to moderate adverse) but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Sound field verification	Revolution Wind would develop and submit an acoustic monitoring and sound field verification plan to BOEM, the USACE, and NMFS for review and written approval at least 90 days prior to initiating underwater noise-producing construction activities. This measure would not result in a change in impact determination for finfish or EFH but would contribute to improved understanding of the nature and duration of these impacts.	This measure would not modify the impact determination for noise effects on finfish or EFH (minor to moderate adverse) but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

Mitigation Measure	Description	Effect
Passive acoustic monitoring	Revolution wind will prepare a passive acoustic monitoring (PAM) plan to record ambient noise and marine mammal and fish vocalizations within the RWF. This plan will include the deployment of moored or autonomous PAM devices capable of detecting the vocalizations of spawning Atlantic cod and, if necessary, other fish species as identified through coordination with cooperating agencies. Acoustic monitoring will be implemented prior to and throughout the construction period and will continue for at least 3 calendar years of Project operations after construction is complete. The archival recorders on these devices will, at minimum, have the capability to detect and store acoustic data on anthropogenic noise sources (such as vessel noise, pile driving, and WTG operation) and Atlantic cod vocalizations. Underwater acoustic monitoring will use standardized measurement methods and data processing and visualization metrics developed for the Atlantic Deepwater Ecosystem Observatory Network for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu). At least two PAM buoys will be independently deployed within or bordering the RWF Lease Area, or one or more buoys will be deployed in coordination with other acoustic monitoring efforts in the RI and MA lease areas.	This measure would not modify the impact determination for construction and operational noise effects on finfish or EFH (minor to moderate adverse) but would improve understanding of these impacts on specific resources (e.g., Atlantic cod) and inform future management and mitigation measures.
Sampling gear	All sampling gear would be hauled out at least once every 30 days, and all gear would be removed from the water and stored on land between survey seasons to minimize risk of entanglement.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Lost survey gear	If any survey gear is lost, all reasonable efforts that do not compromise human safety would be undertaken to recover the gear. All lost gear would be reported to NMFS and BSEE within 24 hours of the documented time of missing or lost gear.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Observer training	At least one of the survey staff onboard trawl surveys and ventless trap surveys would have completed Northeast Fisheries Observer Program training (within the last 5 years) or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon).	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

Mitigation Measure	Description	Effect
Atlantic sturgeon data	Atlantic sturgeon caught and/or retrieved in survey gear would be identified to species or species group, properly documented and data collected, then live, uninjured animals would be returned to the water as quickly as possible after completing the required handling and documentation.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Atlantic sturgeon handling	Atlantic sturgeon caught and/or retrieved in survey gear would be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Take notification	GARFO PRD would be notified as soon as possible of all observed takes of Atlantic sturgeon occurring as a result of any fisheries survey.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Reporting	BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the Proposed Action.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Data collection	BOEM and BSEE would ensure that all Project design criteria and BMPs incorporated in the Atlantic data collection consultation for offshore wind activities (Baker and Howson 2021) shall be applied to activities associated with the construction, maintenance and operations of the Revolution Wind Project as applicable.	This measure would not modify the impact determination for finfish or EFH but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

3.14 Land Use and Coastal Infrastructure

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

3.15 Marine Mammals

3.15.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Marine Mammals

This section evaluates marine mammal resources within the GAA. Because the GAA is extensive (224,314,908 acres, Figure 3.15-1), the analysis focuses on marine mammals that would be likely to occur in and near the proposed RWF and RWEC on an at least infrequent basis and could be impacted by Project activities. The impact levels used to describe effects on marine mammals are defined in Tables 3.3-2 and 3.3-3 in Section 3.3. This impact terminology differs from the effect determinations used by NMFS in ESA Section 7 consultation and the take terminology used for MMPA compliance, therefore the impact levels presented in the biological assessment (BOEM 2022) and incidental harrassment authorization (Orsted 2022) for the Project will differ.

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

The GAA for marine mammals comprises the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, as shown in Figure 3.15-1. This area encompasses the typical movement range within U.S. waters of most marine mammal populations that could occur within or near the RWF and RWEC during the construction and installation, O&M, and decommissioning of the Project.

Affected environment: A diverse marine mammal community inhabits the Northwest Atlantic OCS region (the region). Twenty-nine species, comprising six baleen whale species; 18 species of toothed whales, dolphins, and porpoises; four species of seals; and the West Indian manatee (*Trichechus manatus*), could occur, or are known to occur, in the region (BOEM 2014; CSA Ocean Sciences Inc. 2021). All these species are protected under the federal MMPA, and five are listed as endangered under the ESA. One species, West Indian manatee, is listed as threatened under the ESA. Of the six marine mammals listed under the ESA, critical habitat has been designated for only NARW and West Indian manatee. Manatee occurrence in the RWF and RWEC, while conceivable, is unlikely.

Table 3.15-1 identifies species known or expected to occur in the region and their likelihood and timing of occurrence in the RWF and RWEC. COP Appendix Z (CSA Ocean Associates 2021) provides detailed species descriptions and life history information for all marine mammal species likely to occur in the GAA. NOAA has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2020 stock assessment reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2021).

The EIS analysis focuses on 18 marine mammal species that are known to regularly occur in and around the RWF and RFEC. Several of these species are highly migratory and only occur seasonally, some are present year-round, and some could be present year-round but display distinct seasonal peaks. The ESA-listed species expected to occur are NARW (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*), sei

whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*) (Davis et al. 2020; Kraus et al. 2016; NEFSC and Southeast Fisheries Science Center [SEFSC] 2018). Several other marine mammal species could occur in the general vicinity, including the ESA-listed blue whale (*Balaenoptera musculus*), which is known to occur in the region but primarily in waters along the edge of the OCS that are at least 75 miles from the proposed RWF and RWEC. Species occurrence on the OCS and likelihood of occurrence in the RWF and RWEC maximum work area are summarized in Table 3.15-1 (the maximum work area is shown in Figure 2.1-1). Current status and population trends for marine mammal species that are expected to occur are summarized in Table 3.15-2.

Construction and operational noise are IPFs of particular concern. Thus, consistent with NOAA (2018) guidance, marine mammals have been organized into different hearing groups for the purpose of evaluating underwater noise impacts based on how they hear and their sensitivity to different types of noise. Low-frequency cetaceans, including NARW and other baleen whales, hear and communicate in low-frequency bands from 7 Hz to 35 kHz. Mid-frequency cetaceans, including dolphins and other toothed whales, hear in the 150-Hz to 160-kHz range. High-frequency cetaceans, including the true porpoises, hear in the 275-Hz to 160-kHz range. Phocid pinnipeds (i.e., seals) hear in the 50-Hz to 86-kHz range. BOEM is relying on the current NOAA guidance to assess underwater noise impacts but recognizes that marine mammal hearing is an evolving science. Improved understanding (e.g., Southall et al. 2019) could lead to future refinements of species-specific hearing ranges and sound sensitivity thresholds.

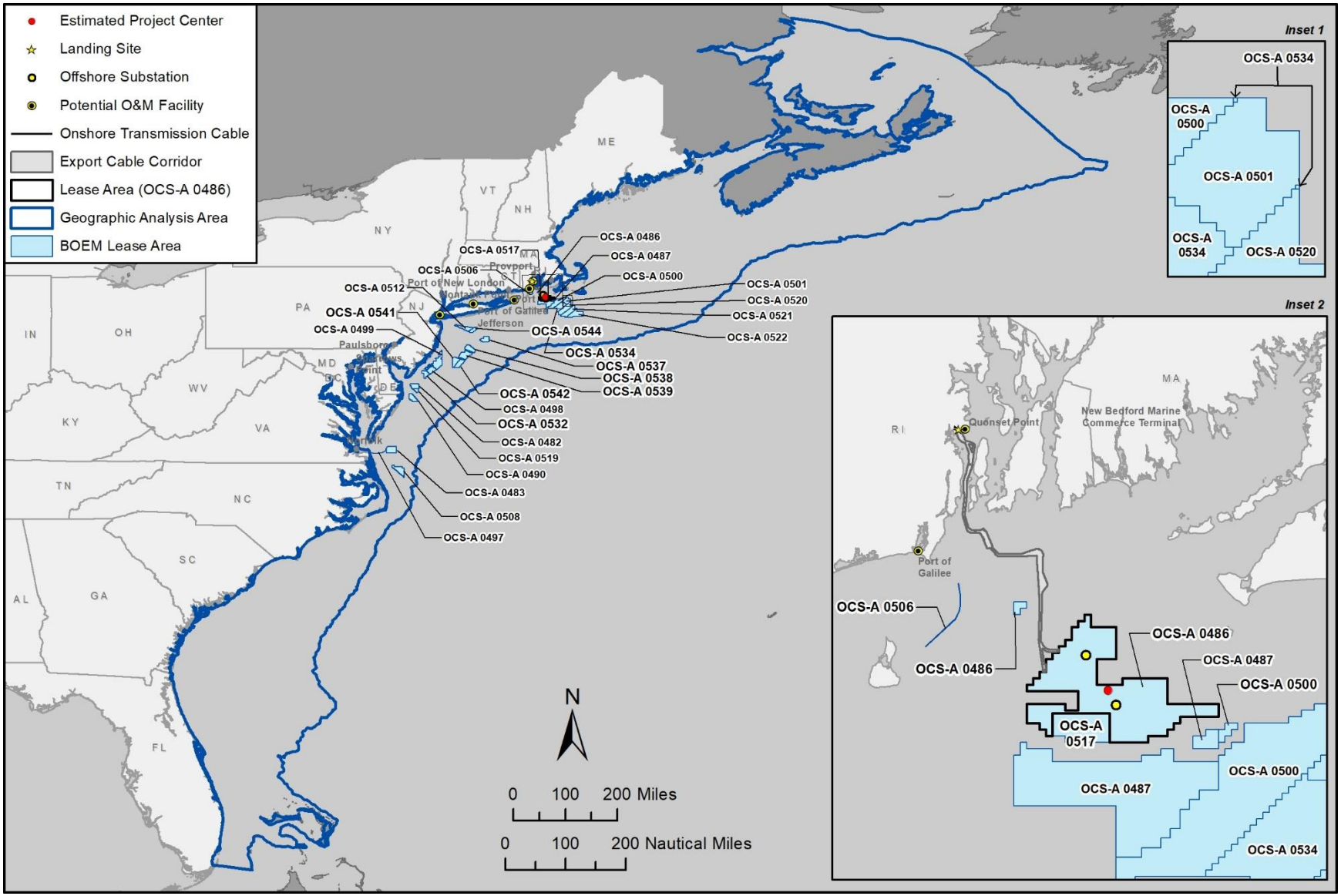

Figure 3.15-1. Geographic analysis area for marine mammals.

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Table 3.15-1. Frequency of Marine Mammal Species Occurrence in Northwest Atlantic Outer Continental Shelf and Likelihood of Occurrence in the Revolution Wind Farm and Revolution Wind Farm Export Cable

Common Name	Scientific Name	ESA/MMPA Status*,†	Occurrence in Northwest Atlantic OCS‡	Annual (peak) Occurrence§	Species Occurs in RWF and RWEC‡,§,¶,#	Critical Habitat Occurs in the RWF and RWEC**
Baleen Whales – Suborder Mysticeti, Family Balaenopteridae						
NARW	*Eubalaena glacialis*	E/D	Common	YR (W-Sp)	Yes	No
Blue whale	*Balaenoptera musculus*	E/D	Rare	YR (W-Sp)	Yes	Not yet designated
Sei whale	*B. borealis*	E/D	Regular	YR (Sp)	Yes	Not yet designated
Fin whale	*B. physalus*	E/D	Common	YR	Yes	Not yet designated
Minke whale	*B. acutorostrata*	None/N	Common	YR (Su-F)	Yes	Not applicable (N/A)
Humpback whale	*Megaptera novaeanglia*	None/N	Common	YR (W-Sp)	Yes	N/A
Toothed Whales – Suborder Odontoceti, Family Physeteridae						
Sperm whale	*Physeter macrocephalus*	E/D	Common	YR (Su-F)	Yes	N/A
Toothed Whales – Family Kogiidae						
Dwarf sperm whale	*Kogia sima*	None/N	Rare	Su	No	N/A
Pygmy sperm whale	*K. breviceps*	None/S	Rare	Su	No	N/A
Toothed Whales – Family Ziphiidae						
Blainville's beaked whale	*Mesoplodon densirostris*	None/S	Rare	YR	No	N/A
Cuvier's beaked whale	*Ziphius cavirostris*	None/S	Rare	YR	No	N/A
Gervais' beaked whale	*M. europaeus*	None/S	Rare	YR	No	N/A
Sowerby's beaked whale	*M. bidens*	None/S	Rare	YR	No	N/A
True's beaked whale	*M. mirus*	None/S	Rare	YR	No	N/A
Toothed Whales – Family Delphinidae						
Risso's dolphin	*Grampus griseus*	None/N	Common§	YR (Sp-F)	Yes	N/A
Long-finned pilot whale	*Globicephala melas*	None/S	Common§	YR (Sp-Su)	Yes	N/A
Short-finned pilot whale	*Globicephala macrorhynchus*	None/N	Rare‡	YR (Sp-Su)	No	N/A
White-beaked dolphin	*Lagenorhynchus albirostris*	None/N	Regular (north of Cape Cod)§	Sp	No	N/A
Atlantic white-sided dolphin	*L. acutus*	None/N	Regular§	YR (Sp-F)	Yes	N/A
Atlantic spotted dolphin	*Stenella frontalis*	None/N	Regular‡,§	Sp-F	No	N/A
Striped dolphin	*S. coeruleoalba*	None/N	Rare‡,§	YR	No	N/A
Short-beaked common dolphin	*Delphinus delphis*	None/N	Common	YR (Su-F)	Yes	N/A
Bottlenose dolphin	*Tursiops truncatus*	None/D††	Common	YR	Yes	N/A

Common Name	Scientific Name	ESA/MMPA Status*,†	Occurrence in Northwest Atlantic OCS‡	Annual (peak) Occurrence§	Species Occurs in RWF and RWEC‡,§,¶,#	Critical Habitat Occurs in the RWF and RWEC**
Toothed Whales – Family Phocoenidae						
Harbor porpoise	*Phocoena phocoena*	None/N	Common	YR (F-Sp)	Yes	N/A
Earless Seals – Order Carnivora, Suborder Caniformia, Family Phocidae						
Harbor seal	*Phoca vitulina concolor*	None/N	Common	YR (F-Sp)	Yes	N/A
Gray seal	*Halichoerus grypus*	None/N	Common	YR	Yes	N/A
Harp seal	*Pagophilus groenlandicus*	None/N	Common	W-Sp	Yes	N/A
Hooded seal	*Cystophora cristata*	None/N	Common	W-Sp	Yes	N/A
Order Sirenia						
West Indian manatee	*Trichechus manatus*	Threatened/S	Rare#	Unknown	No	No

Source: BOEM (2014); CSA Ocean Sciences Inc. (2021); Curtice et al. (2018); Hayes et al. (2020, 2021); Kenney and Vigness-Raposa (2010); Kraus et al. (2016); NEFSC and SEFSC (2018); O'Brien et al. (2021a, 2021b); Quintana et al. (2019)

Note: Species that do not occur in the RWF and RWEC are unexpected to be affected by the Project and are not considered further in this EIS.

* ESA status: E = Endangered.

† MMPA status: S = Strategic; N = Not Strategic; D = Depleted.

‡Kenney and Vigness-Raposa (2010): Common = more than 100 observations; Regular = 10–100 observations; Rare = Fewer than 10 observations.

§ Data from NEFSC and SEFSC (2018) and Davis et al. (2020). YR = year-round; W = winter; Sp = spring; Su = summer; F = fall.

¶ Data from Kraus et al. (2016); O'Brien et al. (2021a, 2021b); Quintana et al. (2019).

Data from CSA Ocean Sciences Inc. (2021).

** Construction vessels traveling to the analysis area could conceivably travel through NARW critical habitat (81 FR 4838). However, specific ports of origin and travel routes are not currently known and will be determined by the Project contractor.

†† There are two stocks of bottlenose dolphins identified in the area. The Northern Migratory Coastal stock is depleted. The Atlantic offshore stock is not depleted.

Table 3.15-2. Population Status, Trend, and Effect of Human-Caused Mortality on Marine Mammal Species Likely to Occur in the Revolution Wind Farm and Revolution Wind Farm Export Cable

Marine Mammal Hearing Group*	Common Name	Scientific Name	Stock	Population Estimate†	Population Trend‡	Annual Human-Caused Mortality§	Effect of U.S. Human-Caused Mortality¶	Reference Source
Low-frequency cetaceans (LFC)	NARW#	*Eubalaena glacialis*	Western North Atlantic	403 to 424; 345 to 369; 368	Decreasing	8.15	Significant	Hayes et al. (2021); Pettis et al. (2021); Pace (2021)
	Blue whale	*Balaenoptera musculus*	Western North Atlantic	402	Unavailable	Unknown	Unknown	Hayes et al. (2020)
	Fin whale#	*B. physalus*	Western North Atlantic	6,802	Unavailable	2.35	Significant	Hayes et al. (2021)
	Sei whale#	*B. borealis*	Nova Scotia	6,292	Unavailable	1.2	Significant	Hayes et al. (2021)
	Minke whale	*B. acutorostrata*	Canadian East Coast	21,968	Unavailable	10.55	Insignificant	Hayes et al. (2021)
	Humpback whale	*Megaptera novaeanglia*	Gulf of Maine	1,393	+2.8%/year	15.25	Significant	Hayes et al. (2021)
Mid-frequency cetaceans (MFC)	Sperm whale¶	*Physeter macrocephalus*	North Atlantic	4,349	Unavailable	Unknown	Unknown	Hayes et al. (2020)
	Risso's dolphin	*Grampus griseus*	Western North Atlantic	35,493	Unavailable	53.9	Significant	Hayes et al. (2020)
	Long-finned pilot whale	*Globicephala melas*	Western North Atlantic	39,215	Unavailable	21	Insignificant	Hayes et al. (2020)
	Short-finned pilot whale	*Globicephala macrorhynchus*	Western North Atlantic	28,924	Unavailable	Unknown	Insignificant	Hayes et al. (2020)
	Atlantic white-sided dolphin	*Lagenorhynchus acutus*	Western North Atlantic	93,233	Unavailable	26	Insignificant	Hayes et al. (2020)
	Short-beaked common dolphin	*Delphinus delphis*	Western North Atlantic	172,974	Unavailable	399	Significant	Hayes et al. (2020)
	Bottlenose dolphin	*Tursiops truncatus*	Western North Atlantic - Offshore	62,851	Unavailable	28	Insignificant	Hayes et al. (2020)
			Western North Atlantic – Northern Coastal Migratory	6,639	Decreasing	12.2 to 21.5	Insignificant	Hayes et al. (2021)
High-frequency cetaceans (HFC)	Harbor porpoise	*Phocoena phocoena*	Gulf of Maine/Bay of Fundy	95,543	Unavailable	150	Significant	Hayes et al. (2020)
Phocid pinnipeds (Phocids)	Harbor seal	*Phoca vitulina concolor*	Western North Atlantic	75,834	Unavailable	365	Significant	Hayes et al. (2020)
	Gray seal	*Halichoerus grypus*	Western North Atlantic (U.S. population)	27,131	Increasing	953	Significant	Hayes et al. (2020)
	Hooded seal	*Cystophora cristata*	Western North Atlantic	593,500	Increasing	5,199	Insignificant	Hayes et al. (2019)
	Harp seal	*Pagophilus groenlandicus*	Western North Atlantic	7.4 million	Increasing	232,422	Unknown	Hayes et al. (2020)

* Marine mammal hearing groups defined by NOAA (2018).

† Most recently available stock size estimate, per cited reference.

‡ Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.

§ Based on annual human-caused mortality as a percentage of potential biological removal (PBR): Significant = > 10% of PBR; Insignificant = < 10% of PBR. Statistic based on fishing-related mortality with inferred contribution from other sources (e.g., vessel collisions).

¶ Reflects human-caused mortality from all known sources, including fishing-related, vessel collisions, and other/unspecified. Per cited reference.

Species is ESA listed.

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3.15.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential marine mammal impacts associated with future offshore wind development, with emphasis on the construction and O&M of these facilities. Analysis of impacts presented below are for IPFs with the potential to produce greater than negligible effects. IPFs expected to produce negligible effects to marine mammals are addressed in Appendix E, Table E2-5. Impacts from other ongoing and future non–offshore wind activities are also provided in Appendix E1.

IPF effects from Project decommissioning are discussed where practicable, recognizing that Project decommissioning has not yet been developed and certain impacts cannot be quantified. All wind farm operators would be required to develop and submit a project-specific decommissioning plan to BOEM. Those plans would be subject to independent environmental and regulatory review and approval before decommissioning can proceed. Those reviews would consider the effects of facility removal on all marine biological resources relative to the environmental baseline conditions present at that time.

3.15.1.1.1 Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Anchoring or mooring activities from construction of future wind energy projects could result in seafloor disturbance and suspended sediment impacts within the GAA for marine mammals. It is estimated that 276 construction vessels would result in 2,672 acres of anchoring disturbance during the peak period of construction. Anchoring and mooring of these vessels would have limited adverse effects to marine mammals due to the temporary nature and relatively small area of the impact. Anticipated impacts from increased vessel traffic are discussed in full in the Vessel Traffic IPF below. Entanglement risks to marine mammals from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension. The likelihood of marine mammal entanglement under these conditions is discountable.

Future offshore wind projects could disturb up to 21,073 acres of seafloor while installing associated undersea cables, causing an increase in suspended sediment (see Appendix E, Attachment E4 for calculation details). Those effects would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017). While suspended sediment impacts would vary in extent and intensity depending on project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. Due to the temporary and localized nature of the impacts, the resulting effects of anchoring and cable emplacement on marine mammals would likely be **negligible** to **minor** adverse.

Climate change: Global climate change is an ongoing risk to marine mammals. Hayes et al. (2021) note that marine mammals are being forced to adapt to changes in the spatial distribution and abundance of their primary prey resources. The range of habitats for many finfish, invertebrate, and zooplankton species on the mid-Atlantic OCS are shifting northward and toward deeper waters in response to changes in temperature regime, acidification, and other climate-driven effects on the ocean environment. The potential implications of these and other related environmental changes for marine mammals, and the ways in which they are likely to interact with the effects of regional offshore wind development, are complex and uncertain. This is particularly true when evaluating potential effects at the scale of the GAA.

However, it is likely that some species are likely to adapt to these environmental changes more effectively than others. In contrast, populations that are already vulnerable, such as NARW, could face increased risk of extinction as a consequence of climate change and other factors. The nature and potential significance of these effects to marine mammals is unknown and likely to vary by species depending on a number of complex factors, ranging from **minor** to **moderate** adverse.

Noise: Numerous proposed offshore wind projects could be developed on the mid-Atlantic OCS between 2022 to 2030 (see Appendix E). BOEM recently completed a programmatic ESA consultation for HRG survey activities supporting planned offshore wind energy development on the mid-Atlantic OCS from June 2021 through June 2031. In addition to project-specific EPMs, BOEM would require compliance with all conditions of ESA and MMPA compliance and other federal regulations. That process is likely to result in additional measures to avoid and minimize adverse noise effects on marine mammals resulting from the various potential exposure scenarios described below.

Two types of underwater noise are considered in this assessment, impulsive and non-impulsive. Impulsive noise sources produce intermittent, short-duration, high-intensity sound pulses in rapid succession, and include sources like impact pile driving and HRG surveys. Non-impulsive sound sources are typically of lower intensity but are effectively continuous and include sources such as vibratory pile driving, construction and O&M vessel use, and WTG operations. Based on the anticipated extent of noise impacts, it is reasonable to conclude that sound sources such as impact pile driving, construction vessels, and HRG survey noise associated with offshore wind energy development could adversely affect marine mammals. In addition, construction noise impacts from future offshore projects could affect marine mammal use of the GAA and/or the availability of fish and invertebrate prey resources.

Impulsive Noise: The installation of up to 3,008 new offshore wind structures on the GAA under the No Action Alternative would likely involve impact pile driving, an intense source of underwater noise with the potential to impact marine mammals. Preconstruction HRG surveys conducted for these projects would also generate impulsive noise of lower intensity that is less likely to injure marine mammals but could alter their behavior. Other potential sources of impulsive noise include use of a pneumatic hammers (e.g., for landfall construction) and UXO detonation. The potential duration and extent of underwater noise effects on marine mammals from these sound sources are described below.

The planned construction of up to 3,008 new offshore wind structures would begin in 2022 and continue through 2030. Many of these structures would be installed using impact pile driving, producing high-intensity impulsive underwater noise at levels exceeding injury and behavioral-level effect thresholds for marine mammals. These noise impacts could affect marine mammal use of the GAA, and/or the availability of fish and invertebrate prey resources and would vary in extent and intensity based on the scale and design of each project. Noise effects could increase in significance if individual marine mammals and/or their prey and forage resources experience repeated stressor exposures from multiple projects.

Marine mammals could experience any of the following three potential exposure scenarios under the No Action Alternative:

- Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
- Non-concurrent exposure to noise from multiple pile-driving events within the same year

- Exposure to two or more concurrent or non-concurrent pile-driving events over multiple years

Based on currently planned project schedules, the concurrent exposure scenario could occur under the No Action Alternative. The number of potential concurrent exposure days within the RI/MA and MA WEAs, for example, is estimated to range from 74 to 246 assuming one foundation installation per project per day, and from 37 to 123 days assuming two foundations per project per day, depending on the year (based on active projects listed in Table E3-1 in Appendix E3). Behavioral avoidance of noise impacts could also indirectly affect marine mammal use of the area, even if significant impacts do not occur therein. An individual marine mammal present in either of these areas on those days could be exposed to the noise from more than one pile-driving event per day, repeated over a period of days.

Concurrent pile driving within and between future projects would increase the intensity and extent of sound exposure within the respective impact areas but would decrease the total number of days of stressor exposure in any given year. It may be desirable to plan for concurrent pile driving to avoid underwater noise impacts during critical periods when sensitive or particularly vulnerable populations (e.g., NARW) are most likely to be present. However, this could result in greater exposure for marine mammal species that are more likely to be present when concurrent pile driving occurs. These individuals could be more likely to suffer noise-related permanent threshold shift (PTS) impacts and other adverse physiological and behavioral effects as a consequence. Physiological effects could include elevated chronic stress and depressed immune function (Erbe et al. 2018; Romano et al. 2004; Wright et al. 2007).

Under the non-concurrent exposure scenario, individual marine mammals could be exposed to multiple non-concurrent pile-driving activities at different times within the same year. This scenario includes concurrent neighboring projects that time their respective pile-driving activities to occur on different days. Non-concurrent pile driving would decrease the intensity and extent of impulsive noise exposure but would increase the total number of exposure days. Given that multiple future actions are proposed for construction between 2022 and 2030 (see Table E3-1 in Appendix E3), it is likely that some individual marine mammals would experience two or more impact pile-driving noise exposure days within the same year.

UXO detonation may be necessary within proposed future project areas prior to ground-breaking activities if devices cannot be safely relocated. The potential number, size, and distribution of UXOs within the GAA is not currently known and would be assessed during preconstruction surveys. Although the shock pulse and pressure waveforms of explosive detonation is significant and distinct from impact pile driving, use of attenuation methods such as bubble curtains is expected to be effective at minimizing effects (Bellman et al. 2020, Hannay and Zykov 2021). Potential effects of UXO detonations would be fully assessed for each future proposed project, based on site-specific information.

HRG surveys would also produce mobile impulsive underwater noise. BOEM (2021a) reviewed underwater noise levels produced by the available types of HRG survey equipment as part of a programmatic biological assessment for this and other activities associated with regional offshore wind energy development. NMFS (2021a) concurred with BOEM's determination that planned HRG survey activities using even the loudest available equipment types would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. The rationale supporting this conclusion also applies to non-listed marine mammal species. Specifically, the noise levels produced by HRG survey equipment are relatively low, meaning that an individual marine mammal would have to remain close to the sound source for extended periods of time to experience injury. This type of exposure is unlikely as the sound sources are continuously mobile and some sources are directional (i.e., pointed at the bottom). These

measures would effectively avoid the risk of PTS or temporary threshold shift (TTS) effects on marine mammals from HRG survey activities. While individual marine mammals could be exposed to HRG survey noise sufficient to cause behavioral effects, those effects would be temporary in nature and unlikely to cause any perceptible longer-term consequences to individuals or populations.

Under the No Action Alternative, it is likely that underwater noise impacts sufficient to cause adverse effects on marine mammals could occur. This could result from direct noise impacts that adversely affect marine mammals and/or their prey species, or from behavioral effects that alter marine mammal use of the area. The extent, duration, and significance of these effects would vary based on project-specific factors. All future actions are expected to include EPMs to avoid and minimize impacts on marine mammals. When these factors are considered, the effects of impulsive noise exposure on marine mammals under the No Action Alternative would range from **minor** to **moderate** adverse, varying by species, because of the anticipated noise from pile driving.

Non-impulsive Noise: The construction and O&M of planned future wind projects would generate non-impulsive underwater noise from vibratory pile driving during construction, helicopters and fixed-wing aircraft noise, construction and O&M vessel engines, and operational noise from WTGs. Horizontal directional drilling proposed at the landfall site also has the potential to produce non-impulsive noise; however, analysis of noise produced by such methods suggest that levels would be low, especially compared to other activities occurring in the same location (Nedwell et al. 2012). These new sources of non-impulsive noise sources under the No Action Alternative would add to other human-made sources of non-impulsive noise that account for the majority of ambient noise pollution in the marine environment. Continuous low-frequency sound from large vessel engines, specifically ocean-going cargo, tanker, and container vessels, is the primary source of ambient noise pollution in the marine environment (Basset et al. 2012). While smaller vessels, activities such as vibratory pile driving, and offshore wind farm operations also generate non-impulsive noise, these sources are likely to account for a small percentage of ambient noise energy in the marine environment.

Construction vessels associated with planned offshore wind projects are the most likely sources of non-impulsive underwater noise impacts to occur in the GAA. Vibratory pile-driving noise from the installation of cofferdams as part of cable installation for future projects could also occur in the GAA. Non-impulsive noise impacts on marine mammals resulting from these activities would vary in location, extent, and duration, as determined by the specific design and construction requirements for each project. The resulting effects on marine mammals would similarly range from **minor** to **moderate** adverse, varying by marine mammal species.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems such as those proposed for the RWF. Underwater sound pressure level (L_{rms} or SPL) measurements taken approximately 50 to 200 m from operating turbines were generally in the range of 115 to 125 dB re 1 µPa, in the 10-Hz to 8-kHz bandwidth at a reference distance of 164 feet (50 meters). This is consistent with the L_{rms} observations at the BIWF (110 to 125 dB re 1 µPa at 50 meters) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than

those reported in earlier research. This suggests that operational noise effects on marine mammals could be more intense and extensive than those considered herein, but additional research is needed. Operational noise from offshore wind turbines on the order of 115 to 120 dB re 1 µPa at 164 feet (50 meters) would attenuate below the 120 dB re 1 µPa marine mammal behavioral disturbance threshold (NMFS 2019) within approximately 35 to 165 feet of each foundation. Kraus et al. (2016) measured ambient noise conditions at three locations within and adjacent to the proposed RWF over a 3-year period and identified baseline levels of 102 to 110 dB re 1 µPa.[32] Operational noise of 115 to 120 dB re 1 µPa at 164 feet would attenuate below existing ambient noise levels within a few hundred to approximately 1,200 feet of each foundation as estimated using the cylindrical spreading model (University of Rhode Island 2021). This indicates that operational noise effects from other future actions would likely be **minor** adverse for the duration of operations because of the limited spatial extent of impacts.

O&M vessels travelling through the GAA would generate underwater noise that would likely be measurable and detectable by marine mammals, but the effects would be temporary and localized. Impacts on individuals and/or their habitat would not lead to population-level effects. On this basis, the effects of underwater noise from future O&M vessel activities would likely be **minor** adverse and temporary (i.e., during vessel transit).

Planned future actions could also employ helicopters and fixed-wing aircraft for initial site surveys, establishing and monitoring protected species exclusion zones during project construction, and for periodic facility inspections during project O&M. Aircraft performing these activities in the GAA could travel close to and affect marine mammals. In general, marine mammal behavioral responses to aircraft most commonly occur at distances of less than 1,000 feet, and those responses are typically limited and likely insignificant (Patenaude et al. 2002). Similarly, aircraft could disturb hauled-out seals if aircraft overflights occur within 2,000 feet of a haul-out area. BOEM would require all aircraft operations to comply with current approach regulations for any sighted NARWs or unidentified large whale. Current regulations (50 CFR 224.103(c)) prohibit aircraft from approaching within 1,500 feet of NARW. BOEM expects that most aircraft operations would occur above this altitude limit except under specific circumstances (e.g., helicopter landings on the service operations vessel or visual inspections of WTGs). Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these brief and infrequent exposures would result in measurable adverse effects on any marine mammal. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the No Action Alternative are expected to be **negligible** adverse because of the protective regulations and temporary nature of the impacts.

Presence of structures: The future addition of up to 3,008 new WTG and OSS foundations in the GAA would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. Depending on proximity and extent, hydrodynamic and reef effects from future actions could influence the availability of prey and forage resources for marine mammals. Project-specific effects would vary, recognizing that larger and/or contiguous projects could have more significant hydrodynamic effects and broader scales. This could in turn lead to more significant effects on prey and

[32] These are 50th and 90th percentile values for monitoring locations RI-1, RI-2, and RI-3, as reported by Kraus et al. (2016).

forage resources. BOEM has conducted a modeling study to predict how planned offshore wind development in the RI/MA and MA WEAs could affect hydrodynamic conditions in the northern Mid-Atlantic Bight. Johnson et al. (2021) considered a range of development scenarios, including a large-scale buildout with a total of 1,063 WTG and OSS foundations. They determined that all scenarios would lead to small but measurable changes in current speed, wave height, and sediment transport in the northern Mid-Atlantic Bight. In addition, small changes in stratification could occur, leading to prolonged retention of cold water near the seafloor within the WEAs during spring and summer. Johnson et al. (2021) used an agent-based model to determine how hydrodynamic effects could influence the dispersal patterns of planktonic organisms. They determined that hydrodynamic effects are likely to alter the dispersal patterns of planktonic eggs and larvae, producing localized increases and decreases in larval density at scales ranging from miles to tens of miles. It is reasonable to conclude that hydrodynamic effects could influence the distribution of zooplankton and associated forage fish preyed upon by marine mammals at similar scales. When considered relative to the broader oceanographic factors that determine primary and secondary productivity in the region and seasonal and interannual variability, such localized impacts on zooplankton and fish abundance and distribution are not likely to be biologically significant for marine mammals. In theory, long-term changes in prey distribution on the order of tens of miles could contribute to displacement effects and increased interaction with fisheries; however, the likelihood and potential significance of such effects is unknown. Refer to Sections 3.6.1.1.1 and 3.13.1.1.1 for discussions of reef and hydrodynamic effects on invertebrates and finfish, respectively, from future offshore wind activities.

The long-term presence of WTG structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. The evidence for long-term displacement is unclear and varies by species. For example, Long (2017) studied marine mammal habitat use around an ocean energy testing facility and found evidence of displacement during construction, but habitat use appeared to return to normal during facility operation. He cautioned that these findings were not definitive and additional research was needed. In contrast, Tielmann and Carstensen (2012) observed clear long-term (greater than 10 years) displacement of harbor porpoises from commercial wind farm areas in Denmark. Displacement effects remain a focus of ongoing study (Kraus et al. 2019). Other studies have documented apparent increases in marine mammal density around wind energy facilities. For example, Russel et al. (2014) found clear evidence that seals were attracted to a European wind farm, apparently by the abundant concentrations of prey created by the artificial reef effect. Gray seals are particularly susceptible to entrapment in trawl fisheries (Lyssikatos 2015). If commercial trawling were to occur near wind farms, increased interactions and resulting mortality of gray seals could occur.

Hayes et al. (2021) note that marine mammals are following shifts in the spatial distribution and abundance of their primary prey resources driven by increased water temperatures and other climate-related impacts. These range shifts are primarily oriented northward and toward deeper waters. The widespread development of offshore renewable energy facilities could facilitate climate change adaptation for certain marine mammal prey and forage species. The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance (van Berkel et al. 2020). There is considerable uncertainty as to how these broader ecological changes would affect marine mammals in the future, and how those changes will interact with other human-caused

impacts. The effect of these reef effects and hydrodynamic impacts on marine mammals and their habitats under the No Action Alternative could be beneficial or adverse, varying by species, and their significance is unknown, potentially effects could be **minor** adverse, negligible, or **moderate** beneficial.

The presence of structures could also concentrate recreational fishing around foundations, potentially increasing the risk of marine mammal entanglement in both lines and nets and increasing the risk of injury and mortality due to infection, starvation, or drowning (Moore and van der Hoop 2012). Fisheries interactions are likely to have demographic effects on marine mammal species, with estimated global mortality exceeding hundreds of thousands of individuals each year (Read et al. 2006; Reeves et al. 2013; Thomas et al. 2016). These structures could also result in fishing vessel displacement or gear shift. The potential impact to marine mammals from these changes is uncertain. However, if a shift from mobile gear to fixed gear occurs, there would be a potential increase in the number of vertical lines, resulting in an increased risk of marine mammal interactions with fishing gear. In the Atlantic, bycatch and harmful interactions occur in various gillnet and trawl fisheries in New England and the mid-Atlantic coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; Morin et al. 2018; NOAA 2021a; 86 FR 51970). Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARW and could be a limiting factor in the species' recovery (Knowlton et al. 2012). Johnson et al. (2005) report that 72% of NARWs show evidence of past entanglements. Additionally, recent literature indicates that the proportion of NARW mortality attributed to fishing gear entanglement is likely higher than previously estimated from recovered carcasses (Pace et al. 2021). Entanglement could also be responsible for high mortality rates in other large whale species (Read et al. 2006). Abandoned or lost fishing gear could get tangled with foundations, reducing the chance that abandoned gear would cause additional harm to marine mammals and other wildlife, though debris tangled with WTG foundations could still pose a hazard to marine mammals. BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures. These inspections would provide a mechanism for removing harmful marine debris, reducing associated risks to marine mammals.

Although the type and magnitude of effect from displacement and shifts in prey resources due to the presence of structures are largely unknown and would vary by species, the possibility of changes in distribution relative to commercial fishing activity and increased interaction with fishing gear poses the potential for increased risk of entanglement. Should such changes occur, increased risk of entanglement would constitute a **minor** to **moderate** adverse effect on marine mammals, varying by species and population status, because this stressor is a documented source of injury and mortality. In the case of NARW, the potential for increased exposure to entanglement could pose a significant risk as injury or mortality that removes even one juvenile or reproductive age individual from the population would constitute a **major** adverse effect. It is important to stress that the likelihood of this level of effect is unclear because it is not known if the presence of structures would displace NARW and whether displacement would lead to increased fishing gear exposure. These potential long-term impacts would persist until decommissioning is complete and structures are removed. Anticipated EPMs would help to offset the potential impact of entanglement within derelict fishing gear or marine debris.

Vessel traffic: BOEM estimates that construction of future offshore wind projects would begin in earnest in 2022 and conclude in 2030. Vessel activity could peak in 2025 with as many as 276 vessels involved in the construction of reasonably foreseeable projects (see Section 3.16.1.1).

Once future projects reach the O&M phase, they would be serviced by crew transport vessels (CTVs) and SOVs making routine trips between the wind farms and port-based O&M facilities. The number and size of CTVs and number of trips per week required for planned maintenance would vary by project based on the number of WTGs. Increased vessel traffic presents a potential increase in collision-related risks to marine mammals. BOEM anticipates that those risks would be minimized by project-specific EPMs and compliance with additional mitigation measures required as a condition of ESA and MMPA compliance. While these measures are likely to be effective in avoiding adverse effects on sensitive species like NARW, they would not eliminate risks to other marine mammal species.

Unplanned maintenance activities would require the periodic use of larger vessels of the same class used for project construction. Unplanned maintenance would occur infrequently dictated by equipment failures, accidents, or other events. Vessel requirements for unplanned maintenance would also likely vary based on overall project size. Unplanned trips would pose similar vessel-related collision risks to marine mammals as for planned trips, but the potential extent and number of animals potentially exposed cannot be determined without project-specific information. Accordingly, adverse effects to marine mammals from increased vessel activity could range from **minor** to **moderate** adverse throughout construction and O&M.

3.15.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on marine mammals associated with the Project would not occur. However, ongoing and future activities would result in a range of temporary to long-term impacts (disturbance, displacement, hearing injury, increased exposure to fishing activity, reduced reproductive and foraging success) on marine mammals, primarily from exposure to construction-related underwater noise, vessel activity, and habitat changes resulting from artificial reef and hydrodynamic effects associated with offshore wind structures.

Based on the analysis presented under the above IPFs, BOEM anticipates that impacts from ongoing activities described in Appendix E, most notably underwater noise and exposure to collision risk associated with vessel traffic, and fishing gear interactions, would be **moderate** adverse for marine mammal species. These ongoing impacts could be of more significance and pose greater risk to NARW due to the critically endangered status of the species. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on marine mammals. Reasonably foreseeable activities other than offshore wind include increasing vessel traffic; new submarine cable and pipeline installation and maintenance; marine surveys; marine minerals extraction; port expansion; channel-deepening activities; military readiness activities; and the installation of new towers, buoys, and piers. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **moderate** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on marine mammals, primarily driven by ongoing noise impacts and interaction with commercial and recreational fisheries gear.

The impact criteria in Table 3.3-2 and Table 3.3-3 are used to characterize the combined effects of all IPFs likely to occur under the No Action Alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable

environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse effects because of the presence of structures, pile-driving noise, and increased vessel traffic. Additionally, the presence of structures could potentially result in **minor** beneficial impacts on some marine mammal species. The majority of offshore structures in the GAA for marine mammals would be attributable to the offshore wind industry. The offshore wind industry would also be responsible for a majority of the impacts associated with new cable emplacement, but effects to marine mammals resulting from these IPFs would be localized and temporary and would not be expected to be biologically significant. The offshore wind industry would be responsible for a majority of the impacts associated with pile-driving noise, which could lead to **moderate** adverse impacts to marine mammals in the GAA. However, overall, this conclusion assumes that irreversible impacts on individual marine mammals would not have negative significant consequences at the population level, or that any population-level effects would be recoverable.

The No Action Alternative would forgo any long-term monitoring that Revolution Wind has committed to, or would be required to perform, the results of which could provide an understanding of the effects of offshore wind development, benefit future management of these resources, and inform planning of other offshore developments. BOEM acknowledges, however, that other ongoing and future monitoring and surveys could provide similar data to support similar goals.

3.15.2 Environmental Consequences

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

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

The Project design parameters in Table 3.15-3 would result in reduced impacts relative to those generated by the design elements considered under the PDE.

Table 3.15-3. Project Design Parameters That Could Reduce Impacts

Parameter	Description
The permitting and installation of fewer WTGs	This would result in fewer offshore structures and reduced IAC cable length. This would reduce the extent of short-term to permanent impacts on marine mammals by reducing the extent and duration of underwater noise impacts from WTG foundation installation, and reducing the extent of reef and hydrodynamic effects resulting from structure presence.
The Project could use a casing pipe method to construct the RWEC sea-to-shore transition	This would result in less acoustic impact than vibratory pile driving to construct a cofferdam (Zeddies 2021).

Parameter	Description
The use of a temporary cofferdam for RWEC sea-to-shore transition construction	This would reduce suspended sediment effects on marine mammals.

See Appendix E, Attachment E2 for a summary of IPFs analyzed for marine mammals across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E, Attachment E2, Table E2-5. Where feasible, calculations for specific alternative impacts are provided in Appendix E, Attachment E4, to facilitate reader comparison across alternatives.

Table 3.15-4 summarizes the IPFs and impact findings carried forward for analysis in this section. Each alternative analysis considers impacts resulting from the construction and installation phase, the O&M phase, and the decommissioning phase of the Project, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts to marine mammals. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the impacts of the Proposed Action on marine mammals is provided in the following section. The impact analyses presented for the other action alternatives focus only on those IPFs that would differ substantively in extent, duration, and/or magnitude between alternatives, resulting in substantially different impacts on marine mammals when compared to the Proposed Action. Offshore and onshore IPFs are addressed separately as appropriate for each resource; not all IPFs have both an offshore and onshore component. For marine mammals, onshore Project activities would not result in impacts to marine resources. Therefore, onshore impacts would have no measurable effects on relevant habitats or species and are not evaluated below.

The Conclusion section for each alternative analysis provides a rationale for each effect determination. The overall effect determination for each alternative is **moderate** adverse for marine mammals.

Table 3.15-4. Alternative Comparison Summary for Marine Mammals

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Anchoring and new cable emplacement/ maintenance	**Offshore**: Anchoring or mooring activities and cable installation from construction of future wind energy projects could result in seafloor disturbance and suspended sediment impacts within the GAA for marine mammals. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension, resulting in limited risk for entanglement. While suspended sediment impacts would vary in extent and intensity depending on project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. The resulting effects of anchoring and cable emplacement on marine mammals would likely be **negligible** to **minor** adverse because of the temporary and localized nature of the impacts.	**Offshore**: Anchoring and cable emplacement effects could lead to short-term adverse effects on invertebrate and finfish prey species. However, these impacts are not likely to significantly affect the availability of prey and forage resources for any marine mammal species. Therefore, anchoring and cable emplacement during construction would have **negligible** adverse effects on marine mammals. Effects to marine mammals from cable O&M and decommissioning and O&M vessel anchoring would be similar in nature but lesser in scale and magnitude than those resulting from Project construction. As such, seafloor disturbance impacts would have **negligible** adverse effects on marine mammals. Vessel anchoring and cable emplacement during construction, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to marine mammals. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals.	**Offshore**: Alternatives C through F would result in the installation of a reduced total length of inter-array cable and a reduced extent of anchoring impacts relative to the Proposed Action. This would proportionally reduce the extent of construction-related impacts on marine mammals. Consistent with the Proposed Action, anchoring and cable emplacement during construction, O&M, and decommissioning would have **negligible** adverse effects on marine mammals, varying in significance by species, for the duration of the construction activities. While suspended sediment impacts would vary in extent and intensity depending on Project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. No population-level effects on marine mammals are expected from reduced water quality. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals.			
Climate change	**Offshore**: The nature and potential significance of climate change effects to marine mammals is unknown and likely to vary by species depending on a number of complex factors, ranging from **minor** to **moderate** adverse.	**Offshore**: The Proposed Action in combination with existing and planned future actions would result in the development of a network of artificial reefs distributed across the GAA. The biological hotspots created by these artificial reefs are expected to influence fish and invertebrate community structure at local scales and could also influence the ability of certain fish and invertebrate species to shift and expand their ranges in response to climate change. This could in turn result in cumulative effects on marine mammals that could be beneficial or adverse depending on a number of complex factors. The nature and potential significance of these effects to marine mammals is unknown and likely to vary by species depending on a number of complex factors, ranging from **minor** to **moderate** adverse.	**Offshore**: Climate change–related impacts to marine mammals under Alternatives C through F would be similar to those described for the Proposed Action. Ongoing trends associated with climate change, including increases in water temperature, ocean acidification, changes in runoff and circulation patterns, and species range shifts are expected to continue. The intensity of climate change impacts on marine mammals is uncertain and is likely to vary considerably between species, with effects ranging from **minor** to **moderate** adverse.			
Noise	**Offshore**: Sound sources such as impact pile driving, construction vessels, and HRG survey noise associated with offshore wind energy development could adversely affect marine mammals. All future actions are expected to include EPMs to avoid and minimize impacts on marine mammals. When these factors are considered, the effects of noise exposure on marine mammals under the No Action Alternative would range from **minor** to **moderate** adverse, varying by species. Noise and disturbance effects on marine mammals from aircraft operations under the No Action Alternative are expected to be **negligible** adverse because of protective regulations and temporary nature of the impacts.	**Offshore**: Construction of the RWF and RWEC would produce short-term underwater and airborne noise with the potential to affect marine mammals. Overall, underwater noise during impact pile-driving activities would have a **negligible** to **moderate** adverse effect on marine mammals, depending on the species. The indirect effect of this underwater noise on marine mammals through impacts to prey species would be short term and **negligible** adverse due to the availability of prey resources for marine mammals on the OCS. Likewise, airborne pile-driving noise would be **negligible** adverse because of established EPMs and likely avoidance response. While some individual marine mammals could experience short-term behavioral and auditory effects from vessel noise exposure, these effects would be short term in duration and broader stock or population-level impacts would be unlikely. Therefore, construction	**Offshore**: See Section 3.15.2.3.1 for construction impacts. Operational noise impacts under Alternatives C through F would be similar to those described for the Proposed Action (**negligible** to **moderate** adverse) but reduced in extent. Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. The low-frequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species. However, the maximum predicted operational noise level would attenuate below the behavioral effects threshold for marine mammals within 120 feet of each turbine foundation, suggesting that behavioral and masking effects would occur within a small radius around each turbine. Vessels used for Project monitoring would produce noise, but the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects.			

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		vessel noise impacts on marine mammals would likely be **minor** adverse. Noise and disturbance effects on marine mammals from aircraft operations are also expected to be **minor** adverse because of protective regulations and the temporary nature of the impact. Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. This localized, long-term impact would constitute a **moderate** adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be **negligible** adverse because of the lack of overlap with the frequencies used for hearing and communication. Noise levels generated by the larger SOVs would be similar to those for Project construction vessels and would result in short-term **minor** adverse noise effects that would occur periodically throughout the life of the Project. Noise effects from vessels associated with monitoring efforts and decommissioning would result in **negligible** adverse impacts to marine mammals because of the limited exposure to noise. BOEM anticipates that future MMPA approvals would consider the known status of individual marine mammal stocks and populations, indirectly incorporating the potential combined effects of future projects. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be **moderate** adverse because of the potential for PTS, TTS, and behavioral impacts during construction activities. While the potential for broader effects is unclear BOEM concludes that the cumulative effects of low-level operational noise could rise to the level of **moderate** adverse for certain marine mammal species.	The associated disturbance from decommissioning would be similar to construction, with the exception that pile driving would not be required. Monopiles would be cut below the bed surface with equipment-producing noise levels generally indistinguishable from engine noise (Pangerc et al. 2016). Due to the higher capacity of the turbines, there is potential for greater operational noise impacts around each individual turbine for Alternative F, although specifics of these impacts are not certain. Effects from Alternatives C through F would combine with similar effects resulting from the construction and installation, O&M, and decommissioning of other planned offshore wind projects on the mid-Atlantic OCS. Up to 3,008 new offshore structures associated with offshore wind development would be installed on the GAA under the No Action Alternative. The installation of these structures would likely involve impact pile driving, an intense source of underwater noise with the potential to impact marine mammals. Alternatives C through F would contribute an appreciable increase in underwater noise due to the installation of up to 93 foundations. HRG surveys, vessel engines, and operational noise from the WTGs would also contribute non-impulsive noise that could result in behavioral effects or displacement of marine mammals. On this basis, cumulative adverse effects on marine mammals resulting from underwater noise are likely to be **minor** to **moderate** adverse, varying by species.			
Presence of structures	**Offshore**: The future addition of new WTG and OSS foundations in the GAA would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. The effect of these effects on marine mammals and their habitats could be beneficial or adverse, varying by species, and their significance is unknown, potentially ranging from **minor** adverse to **negligible** to **moderate** beneficial. However, the potential interaction with fishing gear and increased risk of entanglement is considered to have a **minor** to **moderate** adverse effect on marine mammals because of the documented significance of entanglement events.	**Offshore**: Effects on marine mammals from installation of WTG and OSS foundations construction would result primarily from underwater noise impacts related to impact pile driving and noise disturbance from associated vessel activity. Therefore, construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on marine mammals, varying in significance by species. RWF monopile foundations would be placed in a grid-like pattern with spacing of approximately 1.0 (0.9 to 1.1) nm between turbines. This spacing relative to animal size indicates that the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals. On this basis, BOEM concludes that the presence of the RWF monopile foundations would pose a **negligible** adverse risk of displacement effects on marine mammals.	**Offshore**: Installation of structures for Alternatives C through F would result in similar impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.1, but those impacts would be reduced in extent and would vary depending on the configuration selected (refer to Table 3.6-18 for configuration details). Indirect effects on the prey base of some marine mammal species (i.e., invertebrates and finfish) from the presence of structures would occur, but these would primarily be limited to long-term effects considered under the O&M and Decommissioning discussion in Section 3.15.2.2.2. Construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on marine mammals, varying in significance by species. Alternatives C through F would reduce the number of offshore wind energy structures. These structures would result in similar impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.2, but those impacts would be reduced in extent. Over the life of the Project, the structures would alter the character of the ocean environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Indirectly, marine mammals could benefit from increased prey abundance around the structures due to long-term reef and hydrodynamic effects. However, these effects would only benefit fish-eating species; effects to marine			

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		However, long-term reef and hydrodynamic effects resulting from the Proposed Action could result in **minor** beneficial effects on fish-eating marine mammals such as dolphins and seals that benefit from increased prey abundance around the structures and **negligible** adverse effects on marine mammals that forage on plankton and forage fish. Habitat conditions would be expected to revert back to those that existed prior to installation. Therefore, the effects of the presence of structures on marine mammals during decommissioning would be **negligible** adverse because the structures themselves would be removed from the habitat. Several projects would be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. It is anticipated that these projects would also employ a similar range of EPMs to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from **minor** to **moderate** adverse varying by species. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. Given these uncertainties, the potential for displacement effects is unknown, but there is currently no basis to conclude that these impacts would result in **moderate** to **major** adverse long-term effects on any species. The cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be beneficial or adverse, could range from **negligible** to **moderate** adverse, and are likely to vary considerably by species.	mammals that forage on plankton and forage fish would be **negligible** adverse. The increase in fish biomass could also result in an elevated risk of entanglement and interaction with commercial and recreational fishing gear, although the implementation of EPMs related to management of debris surrounding the WTGs (see Table F-1 in Appendix F) is expected to limit the risk. Following decommissioning and removal of the structures from the water column, the habitat would be expected to recover to conditions similar to those in the surrounding environment. Therefore, impacts of the presence of structures on marine mammals are expected to be **negligible** adverse to **minor** beneficial for the life of the Project. BOEM estimates that up to 3,008 new WTG and OSS foundations would be added in the GAA under other planned future projects, in addition to 56 to 93 WTG and two OSS foundations proposed under various configurations for Alternatives C through F. The long-term presence of WTG and OSS structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. Addition of these foundations would also result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrate community structure within and in proximity to project footprints. These effects could indirectly influence marine mammals by altering the distribution and abundance of prey species. Increased fish biomass around the structures could also attract commercial and recreational fishing activity, leading to increased risk of entanglement and interaction with fishing gear. However, BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures, thereby reducing the associated risk to marine mammals. The cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be positive or negative, could range from **negligible** to **moderate** adverse, and are likely to vary considerably by species, but there is currently no reasonable scientific basis to conclude that these impact mechanisms would result in **major** adverse effects on any marine mammal species			
Vessel traffic	**Offshore**: Vessel activity is estimated to peak in 2025 with as many as 276 vessels involved in the construction of reasonably foreseeable projects. BOEM anticipates that traffic risks would be minimized by project-specific EPMs and compliance with additional measures required as a condition of ESA and MMPA compliance. Accordingly, effects to marine mammals from increased vessel activity could range from **minor** to **moderate** adverse.	**Offshore**: Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals and collision effects would be **negligible** adverse during the construction phase of the Project. However, vessel displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement. Effects of vessel traffic on marine mammals from Project O&M and decommissioning would be **negligible** to **minor** adverse because of limited exposure and implemented EPMs. BOEM estimates that up to 380 construction vessels could be active within the GAA between 2022 and 2030. BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel	**Offshore**: Construction of Alternatives C through F would result in similar vessel traffic impacts on marine mammals to those described for the Proposed Action, but the total number and distribution of vessel trips would be reduced by varying amounts depending on the configuration selected. Vessel traffic associated with the RWF would be expected to increase less than the 2.1% per year across transects 13-17 (Figure 3.15-2) estimated for the Proposed Action. Therefore, collision-related effects would be **negligible** adverse during the construction phase of the Project. The presence of construction vessels and associated noise and disturbance could cause short-term displacement of marine mammals from preferred habitats. Vessel displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects are also likely the result of construction noise, as described above. O&M and decommissioning of Alternatives C through F would result in similar vessel traffic impacts on marine mammals to those described for the Proposed Action, but those impacts would be reduced in extent. For the Proposed Action, Revolution Wind (Tech Environmental			

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		speed restrictions in posted Dynamic Management Areas (DMAs) and Seasonal Management Areas (SMAs) and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project to avoid marine mammal collisions. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **minor** to **moderate** adverse.	2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. It can be assumed that Alternatives C through F would require similar or slightly fewer vessel trips during O&M. O&M vessel use would represent a minimal increase in regional vessel traffic over the life of the Project, and as detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with marine mammals, making the risk of vessel strikes from Project monitoring vessels unlikely. Consistent with the Proposed Action, adverse effects on marine mammals from vessel collisions or displacement would be **negligible** to **minor** adverse for the life of the Project through decommissioning. As described for the Proposed Action, BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel speed restrictions in posted DMAs and Seasonal Management Areas and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project to avoid marine mammal collisions. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **minor** to **moderate** adverse.			

3.15.2.2 Alternative B: Impacts of the Proposed Action on Marine Mammals

3.15.2.2.1 Construction and Installation

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Effects on marine mammals from anchoring and cable emplacement activities during Project construction would primarily result from noise and disturbance related to vessel activity and exposure to suspended sediments from seafloor disturbance. Potential effects from exposure to vessel activity and suspended sediments from seafloor disturbance are described below under the vessel traffic and sediment deposition and burial IPFs, respectively. Entanglement risks to marine mammals from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor using large heavy anchor chains. Per the COP, no divers would be used and no lines or rigging are anticipated for cable installation and maintenance. Transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension throughout installation. Therefore, the likelihood of marine mammal entanglement is discountable.

Anchoring and cable emplacement effects could lead to short-term adverse effects on invertebrate and finfish prey species. Effects on marine mammal prey resources are described in detail in Sections 3.6.2.2.1 and 3.13.2.2.1, respectively. While indirect effects to fish and invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for any marine mammal species and would therefore be **negligible** adverse. Therefore, anchoring and cable emplacement during construction would have **negligible** adverse effects on marine mammals.

Noise: Construction of the RWF and RWEC would produce short-term underwater and airborne noise with the potential to affect marine mammals. Construction noise sources include impact and vibratory pile driving, HRG surveys, UXO detonation, construction vessels, and helicopters and fixed-wing aircraft. The COP includes EPMs that the Project has committed to implementing and are described in Appendix F, Table F-1.

Impact pile driving would be used to install up to 100 RWF WTG and two OSS foundations. Vibratory pile driving could be used to construct the temporary cofferdam at the RWEC sea-to-shore transition. Construction vessels would be used throughout RWF and RWEC construction. Impact hammer installation of the RWF WTG and OSS foundations would produce the most intense underwater noise impacts with the greatest potential to cause injury-level effects on marine mammals.

Vibratory pile driving would generate intense non-impulsive noise impacts. Non-impulsive noise is less likely to cause injury to marine mammals, but the loud, continuous sound field generated by these sources can interfere with, or mask, communication and the ability to detect predators and locate prey (Hatch et al. 2012; Putland et al. 2017). When moving, construction vessels and marine mammals are moving in relation to one another. This tends to limit the duration of exposure such that injury-level effects are unlikely, but exposures exceeding behavioral and auditory masking thresholds could still occur. In contrast, vibratory pile driving used to install the temporary cofferdam at the RWEC sea-to-shore transition site would be stationary. Vibratory pile-driving noise can cause auditory masking effects over great distances. Vessel engines also produce non-impulsive low frequency sound. While lower in intensity than vibratory pile driving, vessel engines operate continuously and can substantially alter the ambient noise environment.

UXOs could also be present within the maximum work area, and if these devices cannot be safely relocated, they may need to be detonated in place before bed-disturbing construction activities begin. Revolution Wind anticipates that up to 13 UXOs ranging from 5 to 1,000 pounds in size may need to be detonated in place (LGL 2022). The actual number and location of UXOs is not currently known, but the largest devices are most likely to be found within the central portion of the RWF and in state waters on the RWEC corridor at the mouth and outside of Narragansett Bay (Ordtek 2021). The applicant has developed an assessment of potential underwater noise impacts on marine mammals, sea turtles, and finfish from UXO detonation, considering a range of warhead sizes ranging from 5 to 1,000 pounds (2.3 to 454 kg) (Hannay and Zykov 2021). The analysis presented herein considers impacts from detonation of the largest potential UXOs potentially occurring in the maximum work area.

Underwater noise impacts on marine mammals are evaluated using behavioral and injury-level thresholds for different marine mammal species groups developed by NMFS (GARFO 2020; NOAA 2018) and temporary hearing threshold shift (TTS) exposure thresholds developed by the U.S. Navy (2017). Specific injury thresholds are defined for different marine mammal species groups based on hearing sensitivity. These thresholds are summarized in Table 3.15-5. As shown, marine mammals are organized into four groups based on hearing sensitivity, specifically the range of sound frequencies they are most sensitive to. NOAA (2018) has defined dual injury criteria for each group that can be used to evaluate the potential for hearing injury from exposure to different types of noise exposure, such as instantaneous exposure to a single pile strike, cumulative exposure to multiple pile strikes, cumulative exposure to UXO detonation, or cumulative exposure to non-impulsive sources like vibratory pile driving or vessel noise (NOAA 2018). NMFS (NOAA 2018) and the U.S. Navy (2017) have also defined threshold criteria for behavioral and TTS effects from impulsive noise sources and for behavioral effects from non-impulsive noise sources (see Table 3.15-5). The TTS thresholds are used to assess impacts from UXO detonation; the behavioral thresholds are used to assess effects of other construction-related noise (e.g., pile driving, vessel noise). For UXO detonation, thresholds have additionally been defined for non-auditory effects (Hannay and Zykov 2021), which are largely dependent on water depth and animal mass. Due to this dependency, specific thresholds are not presented in Table 3.15-5, but potential exposure is assessed below. BOEM is relying on the guidance and thresholds currently accepted by NOAA to assess underwater noise impacts, but we recognize that marine mammal hearing is an evolving science and improved understanding (e.g., Southall et al. 2019) could lead to future refinements.

Table 3.15-5. Underwater Noise Exposure Thresholds for Permanent Hearing Injury and Behavioral Disruption by Marine Mammal Hearing Group

Hearing Group	Type of Effect	Type of Exposure	Value	Units
LFC	Permanent hearing injury	Cumulative SEL (impulsive)	183	SEL dB re 1 $\mu Pa^2 \cdot s$
		Cumulative SEL (non-impulsive)	199	SEL dB re 1 $\mu Pa^2 \cdot s$
		Peak injury (impulsive)	219	dB re 1 µPa
	Behavioral disturbance	Behavioral (intermittent)	160	dB re 1 µPa
		TTS (peak)	213	dB re 1 µPa
		TTS (cumulative SEL)	168	SEL dB re 1 $\mu Pa^2 \cdot s$
		Behavioral (continuous)	120	dB re 1 $\mu Pa^2 \cdot s$

Hearing Group	Type of Effect	Type of Exposure	Value	Units
MFC	Permanent hearing injury	Cumulative SEL (impulsive)	185	SEL dB re 1 $\mu Pa^2 \cdot s$
		Cumulative SEL (non-impulsive)	198	SEL dB re 1 $\mu Pa^2 \cdot s$
		Peak injury (impulsive)	230	dB re 1 µPa
	Behavioral disturbance	Behavioral (intermittent)	160	dB re 1 µPa
		TTS (peak)	224	dB re: 1 µPa
		TTS (cumulative SEL)	170	SEL dB re 1 $\mu Pa^2 \cdot s$
		Behavioral (continuous)	120	dB re 1 µPa
HFC	Permanent hearing injury	Cumulative SEL (impulsive)	155	SEL dB re 1 $\mu Pa^2 \cdot s$
		Cumulative SEL (non-impulsive)	173	SEL dB re 1 $\mu Pa^2 \cdot s$
		Peak injury (impulsive)	202	dB re 1 µPa
	Behavioral disturbance	Behavioral (intermittent)	160	dB re 1 µPa
		TTS (peak)	196	dB re 1 µPa
		TTS (cumulative SEL)	140	SEL dB re 1 $\mu Pa^2 \cdot s$
		Behavioral (continuous)	120	dB re 1 µPa
Seals and sea lions (Phocids)	Permanent hearing injury	Cumulative SEL (impulsive)	185	SEL dB re 1 $\mu Pa^2 \cdot s$
		Cumulative SEL (non-impulsive)	198	SEL dB re 1 $\mu Pa^2 \cdot s$
		Peak injury (impulsive)	218	dB re 1 µPa
	Behavioral disturbance	Behavioral (intermittent)	160	dB re 1 µPa
		TTS (peak)	212	dB re 1 µPa
		TTS (cumulative SEL)	170	SEL dB re 1 $\mu Pa^2 \cdot s$
		Behavioral (continuous)	120	dB re 1 µPa

Source: GARFO (2020); NMFS (2018); U.S. Navy (2017)
Note: SEL = sound exposure level.

Kusel et al. (2021) and Hannay and Zykov (2021) developed sound source level estimates for monopile installation and UXO detonation activities that could occur under the Proposed Action. They then used those source values to estimate the distance required for that noise to attenuate to the marine mammal exposure thresholds. LGL (2022) reported comparable sound source estimates for vibratory pile driving used for sea-to-shore transition construction. Assessment of construction vessel noise is based on the analysis presented in Denes et al. (2021). The resulting values based on summer modeling conditions, presented in Table 3.15-6, represent a radius extending around each noise source where potential injurious-level effects could occur. The single strike injury distances apply only to impact pile driving and represent how close a marine mammal would have to be to the source to be instantly injured by a single pile strike. The cumulative injury distances consider total estimated exposure within a 24-hour period, meaning a marine mammal would have to remain within that threshold distance over an entire day of exposure to experience hearing injury. The behavioral and TTS values are instantaneous exposure distances, meaning that any animal within the effect radius is assumed to have experienced a temporary to short-term adverse effect.

Table 3.15-6. Distance Required to Attenuate Underwater Construction Noise below Marine Mammal Injury and Behavioral Effect Thresholds by Activity and Hearing/Species Groups

Construction Activity	Number of Sites	Total Days	Species Group	Distance to Peak Injury Threshold (feet)	Distance to Cumulative Injury Threshold (feet)	Distance to Behavioral or Cumulative TTS Effect Threshold (feet)
12-meter WTG monopile foundation installation*	100	33	LFC	< 33	4,954–8,727	11,909–12,336
			MFC	–	0–66	0–12,041
			HFC	525	4,396	11,877
			Phocid pinnipeds (seals)	–	787–1,444	11,909–12,467
15-meter OSS monopile foundation installation*	2	2	LFC	< 33	3,084–5,873	11,516–11,877
			MFC	–	–	0–11,909
			HFC	361	2,723	11,483
			Phocid pinnipeds (seals)	–	33–1,214	11,549–12,303
Temporary cofferdam installation and removal†	1	56	LFC	Not applicable (N/A)	4,823	120,374
			MFC	N/A	–	68,537
			HFC	N/A	207	52,598
			Phocid pinnipeds (seals)	N/A	338	100,784
HRG surveys†,‡	10,775 linear survey miles	248	LFC	N/A	5	463
			MFC	N/A	<3	463
			HFC	N/A	120	463
			Phocid pinnipeds (seals)	N/A	<3	463

Construction Activity	Number of Sites	Total Days	Species Group	Distance to Peak Injury Threshold (feet)	Distance to Cumulative Injury Threshold (feet)	Distance to Behavioral or Cumulative TTS Effect Threshold (feet)
Construction vessel operation[§]	N/A	765	LFC	N/A	367	48,077
			MFC	N/A	115	44,236
			HFC	N/A	338	42,362
			Phocid pinnipeds (seals)	N/A	164	47,001
UXO detonation[¶,#]	13	13	LFC	466–2,776	883–14,009	8,629–44,291
			MFC	138–846	167–1,755	1,243–9,613
			HFC	3,025–17,615	5,512–22,835	19,783–51,181
			Phocid pinnipeds (seals)	518–3,091	236–6,004	3,707–25,656

* Data from Kusel et al. (2021). Values shown are the range of effect threshold distances across all modeled species in each hearing group for summer installation of 12-m WTG monopiles and 15-m OSS monopiles. Installation scenario for 12-m monopiles is 6,500 strikes/pile at installation rate of three piles/day. Installation scenario for 15-m monopile is 11,500 strikes/pile at installation rate of up to two piles/day. All piles installed with a maximum 4,000-kJ hammer with an attenuation system achieving 10-dB sound source reduction.

† Data from LGL (2022) for a sheet pile cofferdam installed using a vibratory hammer. Distance to threshold estimated assuming the use of AZ-type sheet piles, with a maximum of 56 pile-driving days (for installation and removal). Threshold distances shown do not consider geographic confinement by surrounding shorelines of Narragansett Bay.

‡ HRG survey values are maximum threshold distances for each hearing group for the loudest type of equipment likely to be employed, as reported by LGL (2022).

§ Data from Denes et al. (2021). Analysis considered use of dynamic positioning thrusters by construction vessels. This analysis did not consider the timing, frequency, and duration of noise from background vessel traffic in and near the Lease Area. Noise levels produced by construction vessels are expected to be similar to these background sources.

¶ The range of values shown are the minimum and maximum threshold distances for detonation of UXOs ranging in size from 5 to 1,000 pounds at four modeled sites with 10 dB of sound attenuation (Hannay and Zykov 2021). The 1,000-pound UXO is the largest potential explosive device potentially occurring in the maximum work area.

Peak and cumulative PTS threshold distances calculated by Hannay and Zykov (2021) for detonation of 5 to 1,000-pound UXOs with 10 dB of sound attenuation. NOAA uses the larger cumulative threshold distance to assess potential PTS and TTS exposure resulting from UXO detonation (Hannay and Zykov 2021). PTS injury and TTS exposure acreages could occur anywhere within a 46,139 to 567,221-acre zone of potential exposure within and around the maximum work area for the RWF and RWEC, varying by hearing group and type of exposure. The location of detonation impacts and actual likelihood of exposure would depend on where UXOs are encountered.

The PDE for the Proposed Action includes the installation of up to 100 12-meter and two 15-meter monopile foundations using an impact hammer. The installation scenario considered in the acoustic analysis assumes each WTG monopile installation would require up to 6,500 strikes from an impact hammer ranging in energy from 1,000 kJ to 4,000 kJ over 4 hours to achieve desired depth. Up to three WTG monopiles could be installed in 1 day. The 15-meter OSS monopiles would require up to 11,500 strikes from an impact hammer ranging in energy from 1,000 kJ to 4,000 kJ and up to two piles would be installed per day. After each pile is driven to depth, the construction vessel would attach appurtenant platforms and equipment and then reposition to the next foundation site. Under the most aggressive installation scenario, up to three foundations could be installed each day. Additionally, detonation of UXOs within the work area may be required. The UXO exposure distance estimates (presented in Table 3.15-6) reflect the planned use of a noise attenuation system that would reduce the source noise level by an average of 10 dB per hammer strike, which has been demonstrated with currently available technologies under other circumstances (Bellman et al. 2020).

Monopile installation and UXO detonation are the most likely sources of permanent hearing injury and other temporary to short-term effects to marine mammals from Project-related underwater noise. UXO detonation may also result in non-auditory injury (i.e., lung and gastrointestinal tract compression injuries); these effects are dependent on water depth and animal mass (Hannay and Zykov 2021). The likelihood of injury from underwater noise also depends on proximity to the noise source, the intensity of the source, sensitivity to the sound source, and the duration of noise exposure. A summary of the distances required to attenuate impact pile-driving noise for WTG and OSS foundation installation and UXO detonation below exposure thresholds is provided in Table 3.15-6. As shown, the threshold distances for different types of effects varies between marine mammal species depending on hearing sensitivity. For example, a low-frequency cetacean would have to remain within 8,727 feet of a 12-meter monopile installation for 24 hours to experience permanent cumulative hearing injury, referred to as PTS. In contrast, the same animal could immediately experience PTS if it were within 14,009 feet from detonation of a 1,000-pound UXO. Mid-frequency cetaceans and phocid pinnipeds are less sensitive to the intense, low-frequency sounds produced by impact pile driving and would have to be much closer to the source to be injured. For example, phocid pinnipeds would need to remain within less than 787 to 1,444 feet from the same noise sources to experience cumulative injury. Aversion responses (avoidance of sound levels or acoustic sources that are disturbing or injurious) by marine mammals have been documented, and available information suggests that mobile marine mammals are likely to leave areas where potentially harmful noise effects are occurring (Dunlop et al. 2017; Ellison et al. 2012; Southall et al. 2007). A detailed discussion of noise impacts on marine mammals is provided in Vineyard Wind final EIS Section 3.4.1.1.1 (BOEM 2021b).

Vibratory pile driving used during construction of the RWEC sea-to-shore transition would create an exposure area for underwater sound pressure levels in excess of the 120 dB re 1 µPa threshold (NMFS 2019) for behavioral effects from continuous noise sources. Based on sound source modeling conducted to support the Revolution Wind incidental take petition (LGL 2022), vibratory pile-driving noise could theoretically extend outward from the cofferdam site up to 31,955 feet (6.05 miles). The surrounding shorelines of Narragansett Bay would restrict the maximum distance vibratory pile-driving noise could travel, limiting potential exposure to those marine mammal species that are likely to occur within this enclosed embayment. Vibratory pile-driving noise could occur for up to 8 hours per day over a maximum of 56 days: 28 days for installation and 28 days for removal.

HRG surveys would also generate impulsive noise but at a lower intensity than impact pile driving, limiting the duration of exposure. Additionally, as the equipment is mobile, the sound source and marine mammal receptors would be moving in relation to one another, further limiting the duration of exposure. Injury-level effects are therefore unlikely, but exposures exceeding behavioral and auditory masking thresholds could still occur. Revolution Wind estimates that up to 10,755 linear miles of preconstruction HRG surveys would occur over 248 days, averaging to approximately 48 linear miles of exposure each day at a typical vessel speed of 4 knots (LGL 2022). As discussed under the No Action Alternative, BOEM (2021a) reviewed underwater noise levels produced by the available types of HRG survey equipment and NMFS (2021a) concurred with BOEM's determination that the loudest available equipment types would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. While individual marine mammals may be exposed to HRG survey noise sufficient to cause behavioral effects, those effects would be temporary in nature and unlikely to cause any perceptible longer-term consequences to individuals or populations. Therefore, these effects would be **minor** adverse.

As discussed above, the Revolution Wind–committed EPMs would effectively minimize injury risks to most marine mammals from instantaneous and cumulative (i.e., within a 24-hour period) noise exposure. Nighttime pile driving may occur under certain conditions,[33] and mitigation measures are incorporated to appropriately minimize the risks associated with this activity. Proposed measures emphasize protection of the critically endangered NARW and concentrate construction within a timing window when this species is least likely to be present. This timing window is not protective for all species, and some impact areas for PTS and auditory masking, as well as behavioral effects, are large enough that the potential for individual exposure cannot be ruled out.

Kusel et al. (2021) modeled sound attenuation distance to hearing injury thresholds for construction-related impact pile driving and developed estimates of the number of marine mammals that could be exposed to potential adverse noise-related effects from the Proposed Action to support MMPA compliance. Hannay and Zykov (2021) similarly modeled the attenuation distance to marine mammal hearing and bodily injury thresholds for UXO detonation. LGL (2022) then calculated the take associated with these modeled exposure estimates incorporating other factors, such as proposed mitigation measures and marine mammal group sizes. The take results are summarized in Tables 3.15-7 and 3.15-8. LGL (2022) used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to PTS (i.e., permanent hearing injury), TTS (i.e., a temporary and recoverable loss of hearing sensitivity), and other short-term physiological and behavioral effects from exposure to each source of construction noise (e.g., impact pile driving, vibratory pile driving, UXO detonation). The modeled exposure scenario for each species assumed an aggressive construction schedule of up to three WTG monopiles installed per day for 30 days (90 total) during the highest density month of species occurrence in the area and the remaining 10 WTG monopiles and two OSS monopiles installed during the month with the second-highest density. The exposure scenario for UXOs assumes that thirteen 1,000-pound devices would require detonation within the RWF and RWEC work areas and that the devices are distributed such that the exposure areas would not overlap. The take request associated with UXO detonation includes the potential for non-auditory injury. Modeling scenarios assume timing restrictions and the use of a noise attenuation system capable of achieving at least a 10-dB reduction in sound source

[33] Nighttime pile driving may be required under specific circumstances where foundation installation takes longer than anticipated and delaying installation until daylight could present risks to safety and/or structural stability.

level. Exposure may be further minimized by other established measures (e.g., clearance zone monitoring using PSOs and PAM, use of night vision equipment and infrared/thermal imaging technology at night, soft starts, and shutdown procedures). Recent work suggests that the use of infrared technology at night is as effective for detecting marine mammals as daylight visual monitoring (Guazzo et al. 2019; Verfuss et al. 2018). See Appendix F. Table F-1 for a complete list of EPMs.

Table 3.15-7. Estimated Number of Marine Mammals Experiencing a Permanent Threshold Shift from Worst-Case Scenarios for Construction-Related Impact Pile Driving and Unexploded Ordinance Detonation Exposure

Functional Hearing Group	Species	Source: Impact Pile Driving Exposure†	Source: UXO Detonation Exposure‡
LFC	Blue whale§	–	–
	Fin whale§	–	–
	Minke whale	–	–
	Sei whale§	–	–
	Humpback whale	8	–
	NARW§	–	–
MFC	Sperm whale§	–	–
	Atlantic spotted dolphin	–	–
	Atlantic white sided dolphin	–	–
	Common bottlenose dolphin	–	–
	Common dolphin	–	–
	Risso's dolphin	–	–
	Pilot whale	–	–
HFC	Harbor porpoise	–	59
Phocid pinnipeds	Gray seal	–	2
	Harbor seal	–	4

Source: LGL (2022)

Note: Estimated number of individuals is based upon established injury thresholds and considers animal movement modeling for each species.

† Modeled exposure estimates based on a worst-case scenario impact hammer installation schedule of 100 12-meter WTGs and two 15-meter OSS monopiles, with up to three WTGs per day and up to two OSSs per day. Installation scenario assumes use of a noise attenuation system achieving 10-dB effectiveness and seasonal restrictions but does not consider other EPMs or mitigation measures.

‡ Model exposure estimates based on worst-case UXO scenario considering detonation of 13, 1,000-pound (454 kg) explosives with 10 dB of noise attenuation at locations with non-overlapping impacts.

§ Listed under the ESA.

Table 3.15-8. Estimated Number of Marine Mammals Experiencing a Temporary Threshold Shift or Behavioral Effects from Construction-Related Activities

Functional Hearing Group	Species	WTG and OSS Monopile Installation (~no. of individuals)	Sea-to-shore Transition (~no. of individuals)	HRG Surveys (~no. of individuals)	UXO Detonation (~no. of individuals)	Total (~no. of individuals)	NMFS Stock Abundance	Number of Individuals Exposed as Percent of Stock Abundance
LFC	Blue whale*	1	N/A	1	1	3	402	0.7%
	Fin whale*	23	N/A	61	10	94	6,802	1.4%
	Humpback whale	68	N/A	183	20	271	1,396	19.4%
	Minke whale	22	N/A	38	6	66	21,968	0.3%
	North Atlantic right whale*	17	N/A	10	8	35	368	9.5%
	Sei whale*	2	N/A	3	2	7	6,292	0.1%
MFC	Atlantic spotted dolphin	29	0	29	29	87	39,921	0.2%
	Atlantic white-sided dolphin	599	10	48	28	685	93,233	0.7%
	Bottlenose dolphin	899	406	262	14	1,581	62,851	2.5%
	Common dolphin	3,402	133	7,376	387	11,289	172,974	6.5%
	Pilot whale	50	0	11	9	70	68,139	0.1%
	Risso's dolphin	7	0	19	6	32	35,215	0.1%
	Sperm whale*	3	0	2	2	7	4,349	0.2%
HFC	Harbor porpoise	508	137	159	293	1,097	95,543	1.1%

Functional Hearing Group	Species	WTG and OSS Monopile Installation (~no. of individuals)	Sea-to-shore Transition (~no. of individuals)	HRG Surveys (~no. of individuals)	UXO Detonation (~no. of individuals)	Total (~no. of individuals)	NMFS Stock Abundance	Number of Individuals Exposed as Percent of Stock Abundance
Phocid pinnipeds	Gray seal	1,037	301	64	30	1,432	27,300	5.2%
	Harbor seal	1,330	676	142	67	2,215	61,336	3.6%

Source: Hayes et al. (2021); LGL (2022)

Note: Estimated number of individuals is based upon established injury thresholds and considers animal movement modeling for each species. TTS thresholds were used to determine exposure estimates for UXO detonation, while all other exposure estimates are based on the established behavioral thresholds for intermittent and continuous noise (refer to Table 3.15-5).

* Listed under the ESA.

As shown in the above tables, LGL (2022) estimates that four species of marine mammals could experience PTS injury from exposure to underwater noise from impact pile-driving or UXO detonation noise under the Proposed Action. Specifically, up to eight humpback whales, 59 harbor porpoise, two gray seals, and four harbor seals could be exposed to PTS impacts from these activities. Multiple individuals from several species are likely to experience short-term TTS or behavioral effects from exposure to several different sources of Project-related noise, including HRG surveys and sea-to-shore transition construction, in addition to UXO detonation and impact pile driving. TTS and behavioral exposures can have an array of adverse effects on marine mammals, even in the absence of overt behavioral responses. For example, a reduction in effective "communication space" caused by auditory masking can make it more difficult to locate companions and maintain social organization (Cholewiak et al. 2018). This can increase physiological stress, leading to impaired immune function and other chronic health problems (Brakes and Dall 2016; Davis et al. 2017; Hatch et al. 2012). These kinds of effects are most associated with long-term changes in the ambient noise environment, specifically from chronic exposure to noise from increasing levels of marine vessel traffic. All construction-related noise sources would cease once construction is completed, and any animals suffering from TTS or stress from auditory masking and behavioral exposure would be expected to recover fully within hours to days.

The exposure estimates reported in Tables 3.15-5 and 3.15-6 consider the application of seasonal restrictions and noise attenuation systems with 10-dB attenuation efficacy. Additional EPMs and other minimization measures that may further limit exposure include establishment and monitoring of clearance zones using PSOs and PAM use of night vision equipment and infrared/thermal technology during nighttime pile driving, and soft-start and shutdown procedures. These measures would significantly reduce, but not completely avoid, marine mammal exposure to PTS and TTS or behavioral effects. Overall, underwater noise during construction activities would have a **minor** to **moderate** adverse effect on marine mammals, depending on the species.

LGL (2022) did not explicitly consider construction vessel noise in their exposure assessment. In general, vessel noise is unlikely to cause hearing injury in marine mammals because this would require prolonged exposure close to the source (i.e., remaining within 400 feet of a large vessel for 24 hours, per NOAA [2018]). This is an unlikely scenario. For example, an animal swimming at 2.5 miles per hour, the lower end of average swim speeds for the NARW (Baumgartner and Mate 2005), would travel 400 feet in less than 2 minutes. This animal would clear the zone of potential noise exposure around a stationary construction vessel within approximately 4 hours. The likelihood and duration of exposure would be further reduced when construction vessels are moving. Animals and vessels moving in relation to each other are likely to reduce the duration of exposure to potential behavioral and auditory masking effects. However, certain marine mammals, notably dolphins, exhibit "bow-riding" behavior. Bow or wake riding provides an energetic advantage, allowing dolphins to travel at high speeds while using less energy (Würsig 2009). over normal swimming at speeds below 4 knots, becoming more energy efficient at speeds above 7 knots (Williams et al. 1992). Individuals attracted to moving vessels would experience prolonged noise exposure, presumably above the behavioral effects threshold. However, a significant portion of construction vessel activity would occur at speeds at or below 4 knots (e.g., cable installation, HRG surveys, installation vessel travel between foundation sites).

As stated above, though it has not been definitively proven, logic and available data (e.g., Dunlop et al. 2017; Ellison et al. 2012; Southall et al. 2007) suggest that mobile marine mammals would avoid behavioral disturbances like those resulting from vessel noise, meaning that the duration of exposure to

noise from slow-moving or closely clustered and stationary construction vessels would be limited. It is also important to recognize that a substantial portion of construction vessel activity would occur in areas with high existing levels of vessel traffic. As such, construction vessels would contribute to, but may not substantially alter, ambient noise conditions generated by existing large vessel traffic. While some individual marine mammals could experience short-term behavioral and auditory effects from vessel noise exposure, these effects would be short term in duration and unlikely to cause measurable effects at the broader stock or population-level. Therefore, construction vessel noise impacts on marine mammals would likely be **minor** adverse because of the intermittent nature of the impact and potential for avoidance behavior.

Impact pile-driving noise could indirectly affect marine mammals by killing, injuring or temporarily altering the distribution of fish and invertebrate prey (see Sections 3.6 and 3.13). These effects would be limited in extent, short term, and unlikely to measurably affect the amount of prey available to marine mammals across the OCS because 1) the area of effect is small relative to the available habitat; 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae across the GAA, which can range from 1% to 10% per day or higher (White et al. 2014); and 3) construction timing along with development and adoption of an adaptive acoustic monitoring plan for sensitive species that would be intended to avoid noise impacts in areas with sensitive species during spawning periods. Therefore, the indirect effects of underwater noise on marine mammals through impacts to prey species would be short term and **negligible** adverse.

Pile driving also produces airborne noise. NMFS has established a behavioral sound pressure level threshold of 90 dB re 1 µPa for harbor seals and 100 dB re 1 µPa for other otariid and phocid pinniped exposure to airborne noise sources like pile driving (NOAA 2018). No equivalent airborne noise behavioral thresholds have been established for other marine mammal species. Harbor and gray seals are the only pinniped species group expected to occur in the RWF and RWEC vicinity. Based on the cylindrical spreading model described on the website Discovery of Sound in the Sea (University of Rhode Island 2021), behavioral-level effects could be experienced within approximately 500 and 10 feet from impact and vibratory pile-driving locations, respectively. However, because seals would experience behavioral- and injury-level exposures to underwater noise at greater distance, behavioral-level exposure to airborne noise is unlikely to occur as an independent effect. Moreover, marine mammal observers would monitor the affected area for seals and would halt construction if individuals are observed within these limits (refer to Appendix F, Table F-1), further minimizing the risk of seal exposure to airborne noise impacts (Baker et al. 2013; vhb 2022). On this basis, airborne noise effects on seals would be **negligible** adverse because of the established EPMs and likely avoidance response.

Helicopters and fixed-wing aircraft could also be used during Project construction. Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these exposures would result in biologically significant effects on marine mammals. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the Proposed Action are expected to be **minor** adverse because of protective regulations and the temporary nature of the impact.

Presence of structures: Effects on marine mammals from installation of WTG and OSS foundations would result from underwater noise impacts related to impact pile driving and noise disturbance from

associated vessel activity. These impacts are described in the Noise IPF section. Indirect effects on marine mammals such as reduced availability of forage or prey could also result from impacts on invertebrate and finfish prey species (see Sections 3.6.2.2.1 and 3.13.2.2.1, respectively). While indirect effects to fish and invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for marine mammals because of their broad resource base and the minimal anticipated adverse effect to fish and invertebrates during the construction phase. Therefore, construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on marine mammals, varying in significance by species.

Vessel traffic: Construction and monitoring vessels pose a potential collision risk to marine mammals, and the noise and disturbance generated by vessel presence could temporarily displace individual marine mammals from preferred habitats. Based on information provided by Revolution Wind (Tech Environmental 2021), BOEM estimates that Project construction would require up to 968 one-way trips by various classes of vessels between the RWF and regional ports in Rhode Island, Massachusetts, Connecticut, New Jersey, Virginia, and Maryland, as well as ports in Europe over the 2-year construction period. This equates to approximately 40 trips per month or 484 trips per year. In addition, approximately 10,755 linear miles of preconstruction HRG surveys are anticipated to support micrositing of the WTG foundations and cable routes. HRG surveys could occur during any month of the year and would require a maximum of 248 total vessel days. The construction vessels used for Project construction are described in Table 3.3.10-3 in the COP and in Section 3.16. Typical large construction vessels used in this type of project range from 325 to 350 feet in length, from 60 to 100 feet in beam, and draft from 16 to 20 feet (Denes et al. 2021).

Large construction vessels and barges would account for an estimated 44% of these one-way trips, with the remainder comprising CTVs and other small support vessels. BOEM developed a representative analysis of construction vessel effects on regional traffic volume by evaluating the potential increase in transits across a set of analysis cross sections relative to baseline levels of vessel traffic. These cross sections were developed by DNV GL Energy USA, Inc. (2020) to support the COP and are shown in Figures 3.15-2 and 3.15-3.

Using the port of origin information provided by Revolution Wind (Tech Environmental 2021), the estimated 484 construction vessel trips per year would cross transects 13-17 when leaving the RWF and could cross several different transects depending on the destination port. This would equate to a 23% increase in vessel transits across these transects. However, the Automatic Identification System (AIS) data used in transect analysis do not include many recreational vessels that lack AIS transponders and commercial fishing vessels that deactivate their transponders when actively fishing. These two vessel classes account for the vast majority of vessel activity. For example, DNV GL Energy USA, Inc. (2020) estimated over 19,000 one-way trips per year by commercial fishing vessels between the RWF and area ports. When these vessel trips are included, Project construction would result in a 2.1% increase in vessel transits per year across transects 13-17. In summary, this assessment indicates that construction vessels would likely increase vessel traffic to some degree, and large vessel traffic would measurably increase during the 2-year construction period. This indicates the potential for increased risk of marine mammal collisions.

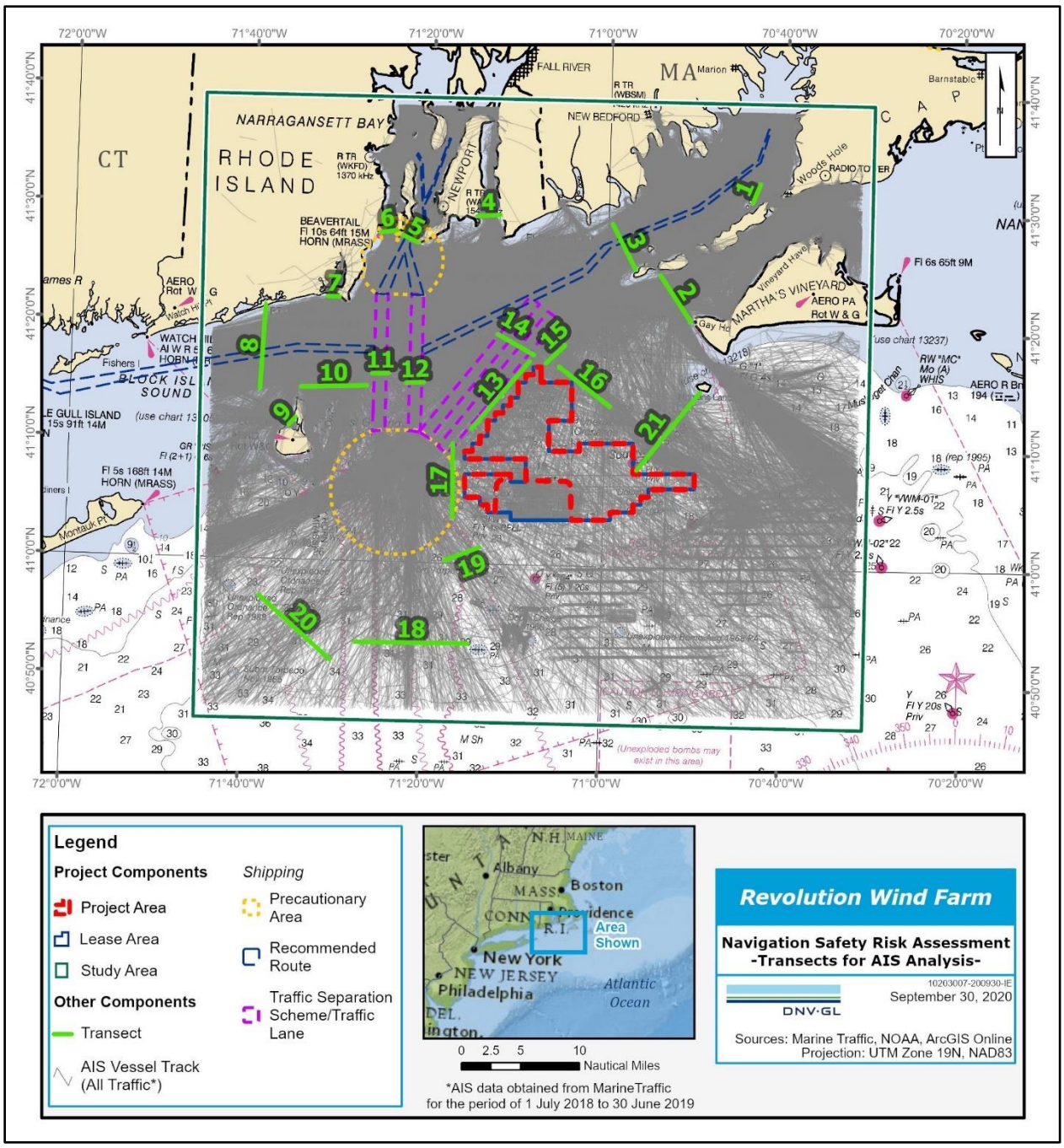

Figure 3.15-2. Automatic Identification System Vessel Traffic Tracks for July 2018 to June 2019 and Analysis Transects Used for Traffic Pattern Analysis (DNV GL Energy USA, Inc. 2020).

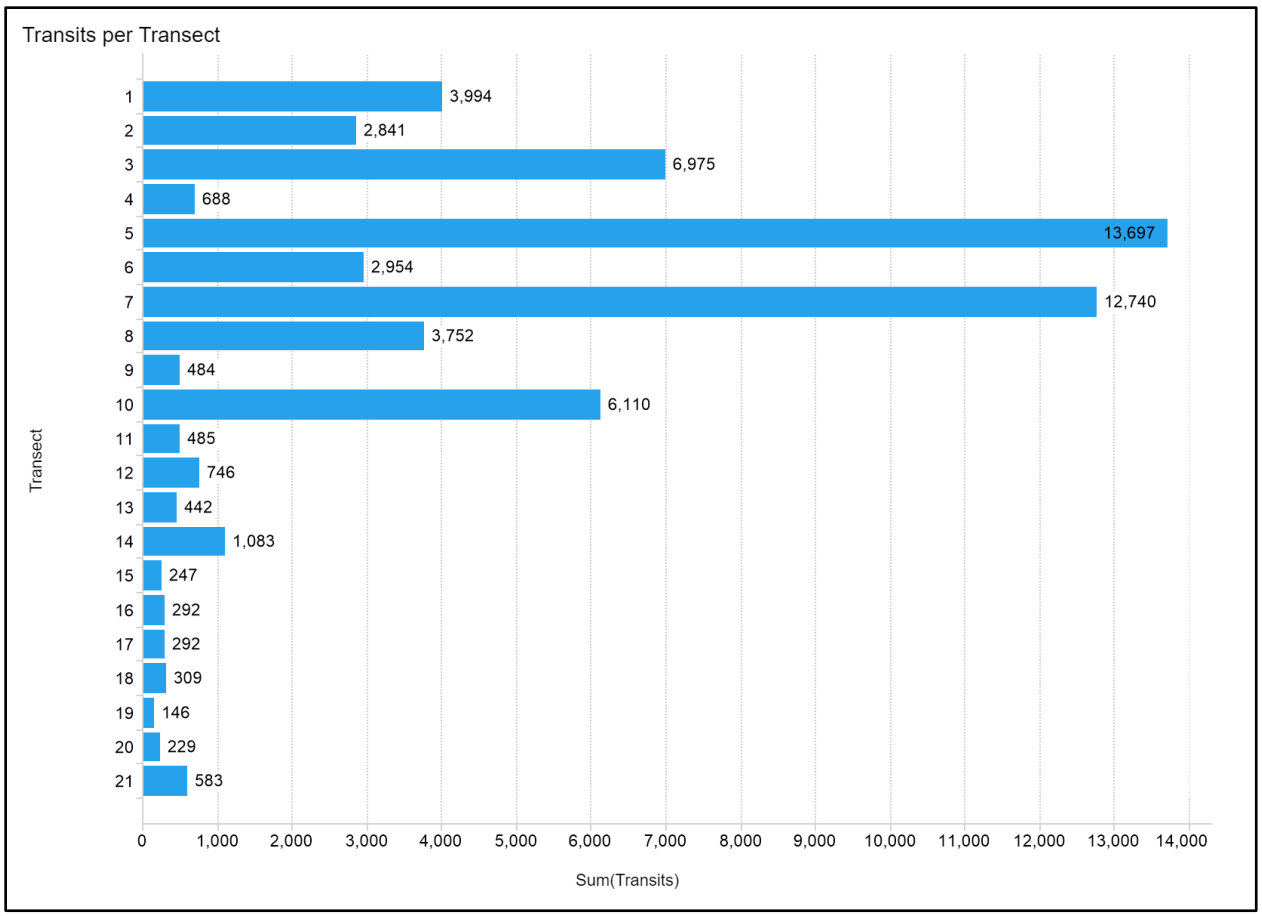

Figure 3.15-3. Vessel Transits of DNV GL Energy USA, Inc. (2020) Analysis Transects Used for Traffic Pattern Analysis from 2018 to June 2019.

Vessel collisions are a major source of mortality and serious injury for many marine mammal species (Hayes et al. 2021; Laist et al. 2001; Rockwood et al. 2017; Schoeman et al. 2020), indicating the importance of protective measures to minimize risks to vulnerable species. If a vessel strike does occur, the impact on marine mammals would range from **negligible** to **major** adverse depending on the species affected and the severity of the strike. However, the applicant has committed to a range of EPMs to avoid vessel collisions with marine mammals (see Appendix F, Table F-1). These include strict adherence to NOAA guidance for collision avoidance and a combination of additional measures, including speed restrictions to 10 knots or less for all vessels at all times between November 1 and April 30 and in all Dynamic Management Areas (DMAs), and use of a PAM system to alert vessels to potential marine mammal presence in real time. All vessel crews would receive training to ensure that these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 1 knot and approximately 4 knots, respectively, and present minimal risk of collision-related injury.

The densities of most common species of marine mammals likely to occur in the RWF Lease Area and RWEC route are low based on monthly mean density estimates developed by Roberts et al. (2016, 2017,

2018, 2020, 2021). Project construction of the maximum case scenario under the Proposed Action would require an estimated maximum of 1,936 round trips for all vessel classes combined over the 2-year construction and installation period. Due to the low relative densities of those species vulnerable to collisions compared to where the majority of the population is, there is a low risk of a marine mammal vessel encounter. Although this would likely be an increase in vessel traffic in and around the maximum work area of approximately 2% a year, the operational conditions combined with planned EPMs and additional mitigation measures agreed upon through agency consultation (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and EPMs to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals and collision effects would be **negligible** adverse during the construction phase of the Project.

The presence of construction vessels and associated noise and disturbance could cause short-term displacement of marine mammals from preferred habitats. Temporary marine mammal displacement from offshore wind energy construction sites have been observed, apparently due to vessel-related disturbance, Long (2017). Habitat use within the affected areas returned to normal after construction was completed, indicating that construction-related displacement effects would be short term in duration. On this basis, vessel displacement effects on marine mammals could range in significance from **minor** to **moderate** adverse depending on the species affected and the biological significance of displacement, recognizing that some portion of these effects are also likely the result of construction noise, as described above.

3.15.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Potential anchoring impacts would be similar to the construction phase, but considerably reduced due to fewer anchored vessels. As stated in Section 3.5.2 of the COP, the Project does not anticipate that the inter-array cables, OSS-link cable, and RWEC would require significant maintenance. The cables themselves are unlikely to require repair, but up to 10% of cable protection may need to be replaced over the life of the Project. The inter-array cables, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Removal of cable protection and extraction of the cable would disturb the seafloor. Vessel anchoring could also be required for specific O&M activities and during Project decommissioning. Effects to marine mammals from cable protection maintenance and vessel anchoring would result primarily from seafloor disturbance, with additional potential effects from underwater noise exposure and collision risk associated with O&M vessel activity. The latter are addressed under their respective IPFs in the following sections. Entanglement risks to marine mammals from vessel anchoring and cable maintenance and decommissioning are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, no divers would be used, and no lines or rigging are anticipated for cable maintenance. The methods used to remove transmission cables at the end of project life would be specified in the decommissioning plan. Therefore, the likelihood of marine mammal entanglement from this IPF is discountable.

The resulting effects to marine mammals from cable O&M and decommissioning and O&M vessel anchoring would be similar in nature but lesser in scale and magnitude than those resulting from Project construction. As discussed in Section 3.15.2.1, seafloor disturbance effects on marine mammals during Project construction are anticipated to be **negligible** adverse. As such, seafloor disturbance impacts of similar nature but reduced in scale and magnitude from Project O&M and decommissioning would have **negligible** adverse effects on marine mammals.

Noise: Offshore WTGs produce continuous non-impulsive underwater noise during operations, mostly in lower frequency bands below 8 kHz. The low-frequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species.

As discussed under the No Action Alternative, Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise and determined that operating turbines produce underwater sound pressure levels of approximately 110 to 118 dB re 1 µPa at a reference distance of 50 meters, in the 10-Hz to 8-kHz range. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from 10-MW current generation direct-drive WTGs (i.e., turbines larger than most previously monitored) and concluded that these designs could generate higher operational noise levels than those reported in earlier research.

The potential for behavioral and auditory masking effects on marine mammals can be evaluated by estimating the area exposed to WTG L_{rms} operational noise above the 120 dB re 1 µPa behavioral effects threshold for continuous noise sources (NMFS 2019). Applying the practical spreading loss model (spreading coefficient of 15 dB/decade of range) and the general rule of thumb for estimating L_{rms} from zero-to-peak sound pressure level (Lpk) (University of Rhode Island 2021),[34] operational ranges of 110 to 118 dB re 1µPa at a reference distance of 164 feet would attenuate below 120 dB re 1 µPa within approximately 35 to 165 feet of each turbine foundation. This suggests that behavioral changes could be expected within a small radius around each turbine.

However, it is also probable that operational noise would change the ambient sound environment within the Lease Area in ways that could affect habitat suitability. This impact can be evaluated by estimating the area exposed to operational noise above the existing environmental baseline. As discussed under the No Action Alternative, Kraus et al. (2016) measured ambient noise conditions at three locations within and adjacent to the proposed RWF over a 3-year period and identified baseline levels of 102 to 110 dB re 1 µPa.[35] Maximum operational noise levels typically occur at higher wind speeds when baseline noise levels are higher due to wave action. Applying the same approach described above, the operational range L_{rms} of 110 and 118 dB re 1 µPa at a reference distance of 50 m would attenuate to the 102 to 110 re 1 µPa baseline within approximately 1,200 feet of each turbine.

Operational noise could interfere with communication and echolocation, reducing feeding efficiency in the areas within a few hundred feet of the monopiles under some conditions. Any such effects would likely be dependent on hearing sensitivity and the ability to adapt to low-intensity changes in the noise

[34] An estimate was calculated using the cylindrical spreading loss model (University of Rhode Island 2021).

[35] These are 50th and 90th percentile values for monitoring locations RI-1, RI-2, and RI-3, as reported by Kraus et al. (2016).

environment. Low-frequency cetaceans are more likely to be affected by operational noise as the frequencies generated largely fall within the range of peak hearing sensitivity for these species. These negative impacts could include a variety of long-term physiological and behavioral effects. For example, a reduction in effective "communication space" caused by auditory masking can make it more difficult to locate companions and maintain social organization (Cholewiak et al. 2018). This can increase physiological stress, leading to impaired immune function and other chronic health problems (Brakes and Dall 2016; Davis et al. 2017; Hatch et al. 2012). These kinds of effects are most associated with long-term changes in the ambient noise environment, specifically from chronic exposure to noise from increasing levels of marine vessel traffic. In contrast, mid-frequency cetaceans such as dolphins and sperm whale and high-frequency cetaceans such as harbor porpoise are likely to be less sensitive to the low-frequency sounds generated by operational WTGs because these species are most sensitive to sound at higher frequencies (Johnson 1967; NOAA 2018). Certain species may also be able to acclimatize and adapt to operational noise. For example, while dolphins vocalize in low to middle frequencies, certain species are known to shift vocalization into higher frequency ranges to communicate more effectively in shallow water and adapt to the presence of anthropogenic noise sources (David 2006; Quintana-Rizzo et al. 2006). Therefore, mid-frequency cetaceans are likely to be able to adapt to operational noise effects while low-frequency cetaceans may experience interference with communication and echolocation.

On balance, operational noise effects from the RWF are likely to be of low intensity and localized to around each foundation. Jansen and de Jong (2016) and Tougaard et al. (2009) concluded that marine mammals would be able to detect operational noise within a few thousand feet of WTGs, but the effects would have no significant impacts on individual survival, population viability, distribution, or behavior. The findings provided above indicate that operational noise effects would attenuate to ambient levels within a few hundred to a few thousand feet of each foundation, but operational noise would be at levels that could cause behavioral reactions in marine mammals within 120 feet of each turbine. There is the potential for a reduction in effective communication space within the wind farm environment for marine mammals that communicate primarily in frequency bands below 8 kHz (i.e., low-frequency cetaceans). This localized, long-term impact would constitute a **moderate** adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be **negligible** to **minor** adverse because operational noise overlaps the sound frequencies used for hearing and communication by these species to a lesser degree. It is unknown if operational noise would contribute to displacement effects to marine mammals.

O&M HRG surveys would also generate impulsive and non-impulsive noise during Project operations. Up to 1,062 linear miles of O&M HRG surveys may be conducted in the RWF and RWEC corridor every year for up to 4 years following Project construction (LGL 2022). As noted above in Section 3.15.2.2.1, BOEM (2021a) determined, and NMFS concurred (NMFS 2021a), that HRG survey activities would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. This finding can also be applied to non-listed marine mammal species. LGL (2022) estimated the exposure of marine mammal species to 4 years of postconstruction HRG surveys (Table 3.15-9). Overall, noise generated by O&M HRG surveys would likely have a **minor** adverse effect on marine mammals because of the limited exposure and likelihood of full recovery within hours to days.

O&M vessels would also generate periodic, short-term underwater noise impacts with the potential to affect marine mammals. Revolution Wind (Tech Environmental 2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips

over the life of the Project. These trips would originate either from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multi-day maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips would be required over the life of the Project for seafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted seasonally. Vessels used would be similar to those used for preconstruction HRG surveys.

Table 3.15-9. Estimated Number of Marine Mammals Experiencing Behavioral Effects from Postconstruction High-Resolution Geophysical Survey Activities

Functional Hearing Group	Species	Estimated Number of Individuals Exposed to Behavioral Level Noise Effects Postconstruction HRG Surveys (4 years total)*	NMFS Stock Abundance	Number of Individuals Exposed as Percent of Stock Abundance
LFC	Blue whale†	4	402	1.0%
	Fin whale†	64	6,802	0.9%
	Humpback whale	184	1,396	13.2%
	Minke whale	40	21,968	0.2%
	North Atlantic right whale†	12	368	3.3%
	Sei whale†	8	6,292	0.1%
MFC	Atlantic spotted dolphin	116	39,921	0.3%
	Atlantic white-sided dolphin	112	93,233	0.1%
	Bottlenose dolphin	260	62,851	0.4%
	Common dolphin	7,284	172,974	4.2%
	Pilot whales	36	68,139	0.1%
	Risso's dolphin	24	35,215	0.1%
	Sperm whale†	8	4,349	0.2%
HFC	Harbor porpoise	156	95,543	0.2%

Functional Hearing Group	Species	Estimated Number of Individuals Exposed to Behavioral Level Noise Effects Postconstruction HRG Surveys (4 years total)*	NMFS Stock Abundance	Number of Individuals Exposed as Percent of Stock Abundance
Phocid pinnipeds	Gray seal	64	27,300	0.2%
	Harbor seal	144	61,336	0.2%

Source: Hayes et al. (2021); LGL (2022)

* Estimated number of individuals is based upon established injury thresholds and considers animal movement modeling for each species.

† ESA-listed species.

Noise levels generated by the CTVs are expected to have source levels of approximately 160 dB re 1 µPa-m, based on observed noise levels generated by working commercial vessels of similar size and class to the CTVs (Kipple and Gabriele 2003; Takahashi et al. 2019). The SOV would produce similar noise levels to those described for construction vessels by Denes et al. (2021), with an approximate L_{rms} source level of 170 dB re 1 µPa-m. BOEM anticipates that underwater noise generated by CTVs and monitoring vessels would overlap the hearing range of fin, NARW, sei, and sperm whales and would be audible to these species. However, the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals and animals are expected to only have short, transient exposures; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects. Noise levels generated by the larger SOVs would be similar to those described in Section 3.15.2.2.1 for Project construction vessels and would result in short-term **minor** adverse noise effects that would occur periodically throughout the life of the Project.

Vessel traffic associated with EPM monitoring could result in brief behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. BOEM expects that these brief responses of individuals to passing vessels would be infrequent. Therefore, noise effects from vessels associated with monitoring efforts would result in **negligible** adverse impacts to marine mammals.

The associated disturbance from decommissioning would be similar to that described above for construction (see Section 3.15.2.2.1), with the exception that pile driving would not be required. While specific decommissioning equipment and methods have not yet been proposed, it is reasonable to assume that the associated impacts would be comparable in magnitude to those resulting from Project construction. One important exception is that impact pile driving would not be required; therefore, underwater noise impacts from decommissioning would be less intense and extensive than those from construction. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). On this basis, short-term effects on marine mammals from decommissioning would be **negligible** adverse because of the limited exposure to noise during decommissioning activities.

Presence of structures: The presence of RWF monopile foundations over the life of the Project would change the offshore environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. As discussed in the No Action

Alternative, Long (2017) compiled a statistical study of seal and cetacean (including porpoises and baleen whales) behavior in and around Scottish wave energy converter facilities. The study found evidence of displacement during construction, but habitat use appeared to return to previous levels once construction was complete. No observable long-term displacement effects on seals, porpoises, dolphins, or large whales from wave energy converter operations were observed, but these findings may not be applicable to offshore wind structures. Long (2017) also cautioned that observational evidence was limited for certain species and further research would be required to draw a definitive conclusion about operational effects. Delefosse et al. (2017) reviewed marine mammal sighting data around oil and gas structures in the North Sea and found no clear evidence of species attraction or displacement. Other studies have documented apparent changes in marine mammal behavior around wind energy facilities. Some research has suggested that wind farm operations may lead to long-term displacement of species such as harbor porpoise, but the evidence is mixed, and observed changes in abundance could be more indicative of general population trends than an actual wind farm effect (Nabe-Nielsen et al. 2011; Tielmann and Carstensen 2012; Vallejo et al. 2017).

The presence of offshore wind structures is unlikely to interfere with marine mammal movement. The up to 102 RWF monopile foundations would be placed in a grid-like pattern with spacing of approximately 1.0 (0.9 to 1.1) nm between turbines. Based on documented lengths (Wynne and Schwartz 1999), the largest NARW (59 feet), fin whale (79 feet), sei whale (59 feet), and sperm whale (59 feet) would fit end-to-end between two foundations spaced at 1 nm 100 times over. This simple assessment of spacing relative to animal size indicates that the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals.

The presence of the RWF could also cause indirect effects on marine mammals by changing the distribution and abundance of preferred prey and forage species. Monopiles and scour protection would create an artificial reef effect (Degraer et al. 2020), likely leading to enhanced biological productivity and increased abundance and concentration of fish and invertebrate resources (Hutchison et al. 2020). This could alter predator-prey interactions in and around the RWF with uncertain and potentially beneficial or adverse effects on marine mammals. For example, fish predators like seals and porpoises could benefit from increased biological productivity and abundant concentrations of prey generated by the reef effect (e.g., Russel et al. 2014). Conversely, increased fish biomass around the structures could attract commercial and recreational fishing activity, creating an elevated risk of injury or death from gear entanglement and increasing the risk of injury and mortality due to infection, starvation, and drowning (Moore and van der Hoop 2012). Fisheries interactions are a known source of negative impacts on marine mammals, with estimated global mortality across species exceeding hundreds of thousands of individuals each year (Read et al. 2006; Reeves et al. 2013; Thomas et al. 2016). Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARW and could be a limiting factor in the species' recovery (Knowlton et al. 2012). However, Project EPMs include inspection and removal of marine debris from foundations (see Table F-1 in Appendix F). This would help to reduce the minimal risk of entanglement in debris caught on structures and provide a mechanism for removing potentially harmful derelict gear from the marine environment.

The presence of vertical structures in the water column could cause hydrodynamic effects that could influence the distribution and abundance of fish and planktonic prey resources (van Berkel et al. 2020). Offshore wind farms can influence hydrodynamic conditions through two mechanisms: turbulent effects

on mixing and stratification patterns caused by current flow around structures in the water column and changes in surface wave and current patterns caused by wind field effects (i.e., the extraction of wind energy from the atmosphere) (Johnson et al. 2021; van Berkel et al. 2020). Turbulence in the water column created by the vertical structures could lead to localized changes in circulation and stratification patterns, with potential implications for primary and secondary productivity and fish distribution. These localized effects would likely be limited to a few hundred to a few thousand feet downcurrent of each foundation.

In contrast, the combined effects of a WTG array on the wind field and surface waves are typically more extensive, extending tens of miles downfield from the wind farm array (Johnson et al. 2021; van Berkel et al. 2020). BOEM conducted a hydrodynamic modeling study to evaluate how wind farm presence could affect the seasonal stratification patterns that contribute to the formation and persistence of the Mid-Atlantic cold pool (Johnson et al. 2021). The findings of this hydrodynamic study and their implications for invertebrates, finfish, and primary and secondary productivity are discussed in detail in Sections 3.6.2.3.2 and 3.13.2.2.2. In summary, the RWF and surroundings are characterized by strong seasonal stratification occurring in summer and early fall, which is expected to limit measurable hydrodynamic effects within the wind farm to within 600 to 1,300 feet downcurrent of each monopile. Localized turbulence and upwelling effects around the monopiles are likely to transport nutrients into the surface layer, potentially increasing primary and secondary productivity. That increased productivity could be partially offset by the formation of abundant colonies of filter feeders on the monopile foundations. As discussed in the No Action Alternative, hydrodynamic effects on wind field and wave energy could influence surface currents at scales on the order of miles to tens of miles, potentially altering the distribution of planktonic organisms (Johnson et al. 2021). These findings suggest that hydrodynamic effects are unlikely to negatively affect the abundance and availability of zooplankton prey but could alter the distribution of prey at similar scales. When considered relative to the broader oceanographic factors that determine primary and secondary productivity in the region and seasonal and interannual variability, localized impacts on zooplankton and fish abundance and distribution are not likely to be biologically significant for marine mammals. In theory, hydrodynamic effects on prey distribution could contribute to displacement effects and increased interaction with fisheries for some marine mammal species; however, the likelihood and potential significance of such effects is unknown.

In summary, long-term reef and hydrodynamic effects resulting from the Proposed Action could result in **minor** beneficial effects on fish-eating marine mammals such as dolphins and seals that benefit from increased prey abundance around the structures. These effects could cause localized changes to prey distribution but do not suggest a major change in prey availability. It is unclear if these have a significant impact to the ability for marine mammals to feed. Long-term reef and hydrodynamic effects could result in negligible adverse effects on marine mammals that forage on plankton and forage fish. Habitat conditions would be expected to revert back to pre-Project conditions when the Project is decommissioned, or similar conditions within the limits determined by climate change and other ongoing environmental trends. BOEM concludes that the physical presence of RWF monopile foundations would pose a negligible adverse risk of displacement effects on marine mammals by posing a barrier to movement. However, this determination does not consider the potential effects of operational noise, which are localized, long-term impacts and would constitute a minor to moderate adverse effect on marine mammals belonging to the low-frequency cetacean hearing group. Operational noise effects on marine mammals in other hearing groups would be negligible to minor adverse because the degree to

which operational noise overlaps the range of frequencies used for hearing and communication is more limited. Therefore, the effects of the presence of structures on marine mammals following decommissioning would be **negligible** adverse because the structures themselves would be removed from the habitat.

Decommissioning would remove the structures from the water column and impacts would cease.

Vessel traffic: Revolution Wind (Tech Environmental 2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. These trips would originate from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multi-day maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or replacing damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips would be required over the life of the Project for seafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted annually. Vessels used would be similar to those used for the HRG surveys conducted prior to and during Project construction.

In general, O&M-related vessel activities would represent a small increase in regional vessel traffic compared to existing conditions. Project O&M could involve up to 10 one-way vessel trips between the RWF and O&M facility or other area ports each month. By comparison, hundreds of large vessels and thousands of smaller vessels, many of the latter comparable in size to the CTV, travel through the areas between the wind farm and proposed O&M facility locations on a monthly basis (Section 3.15.2.2.1). O&M vessel use would therefore represent a minimal increase in regional vessel traffic over the life of the facility.

As detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with marine mammals, making the risk of vessel strikes from Project monitoring vessels unlikely. Based on marine species density studies (Roberts et al. 2016, 2017, 2018, 2020, 2021) using time of year and habitat, the densities of marine mammals in the RFW Lease Area are expected to be low with a low risk of vessels encountering a marine mammal because the area where marine mammals could encounter vessel is not where the majority of the population is found. The operational conditions combined with planned EPMs (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals, including night vision devices and infrared imaging (LGL 2022). BOEM concludes vessel strikes are unlikely to occur and therefore there is no anticipated effect on marine mammals. In the event of an unanticipated vessel strike of a marine mammal, project vessels must immediately cease activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions. Overall, effects of vessel traffic on marine mammals from Project O&M and decommissioning would be **negligible** to **minor** adverse because of limited exposure and EPMs.

3.15.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The Proposed Action would result in localized, temporary, **negligible** adverse impacts to marine mammals through an estimated 7,187 acres of anchoring and cabling-related seafloor disturbance and associated increased suspended sedimentation within the GAA. BOEM estimates a cumulative total of 30,932 acres of seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the GAA. No population-level effects on marine mammals are expected from reduced water quality. However, there could be temporary displacement of marine mammals from preferred habitats, especially during construction activities, due to increased vessel activity. Vessel anchoring and cable emplacement during construction and installation, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to marine mammals. Therefore, the Proposed Action combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative effects on marine mammals.

Climate change: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. Several marine species, including fish, invertebrates, and zooplankton—prey resources for marine mammals—have shifted northward in distribution over the past several decades (NOAA 2021b). Ocean acidification, also a function of climate change, has negatively affected some zooplankton species (PMEL 2020). Marine mammals are modifying their behavior and distribution in response to these broader observed changes (Davis et al. 2017, 2020; Hayes et al. 2020, 2021). These trends are expected to continue, with complex and potentially adverse consequences for many marine mammal species. The Proposed Action in combination with existing and planned future actions would result in the development of a network of artificial reefs distributed across the GAA. The biological hotspots created by these artificial reefs are expected to influence fish and invertebrate community structure at local scales and could also influence the ability of certain fish and invertebrate species to shift and expand their ranges in response to climate change. This could in turn result in cumulative effects on marine mammals that could be beneficial or adverse depending on a number of complex factors. The nature and potential significance of these effects to marine mammals is unknown and likely to vary by species depending on a number of complex factors, ranging from **minor to moderate** adverse.

Noise: BOEM estimates that a cumulative total of 3,110 offshore WTGs and OSS foundations would be developed in the GAA for marine mammals between 2022 and 2030.While the number and distribution of potential UXO encounters is not currently known, it is likely that a least some UXO detonations would be required. Device size is also not currently known but would likely fall within a similar range of impacts to those described for construction of the Proposed Action.

Section 3.15.1.1 provides an overview of potential concurrent construction activities in the GAA. Each action would generate underwater noise of similar type and intensity as the Proposed Action, scaled in extent to the size of each facility. Each future project would be anticipated to result in adverse effects on individual marine mammals, up to and including PTS, and TTS, auditory masking and behavioral impacts. Construction noise would also contribute to short-term displacement effects, as described above.

All future actions would be subject to the same independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of EPMs included in

the Proposed Action to avoid and minimize harmful noise effects. While these measures would avoid and minimize impacts to marine mammals to the greatest extent practicable, some unavoidable impacts on individuals are likely to occur. The impacts of each project would result in **minor** to **moderate** adverse effects on marine mammals, varying by species. BOEM anticipates that future MMPA approvals would consider the known status of individual marine mammal stocks and populations, indirectly incorporating the potential combined effects of future projects. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be **moderate** adverse because of the potential for PTS, TTS, and behavioral impacts during construction activities. NARW could be an exception to this determination because of their perilous population status. Hearing-related injury to even one individual that results in reduced reproductive fitness could contribute to ongoing downward trends in population viability. Should such impacts occur, they would constitute a **major** adverse impact on this species.

As discussed in Sections 3.15.1.1 and 3.15.2.2, operational noise from offshore wind turbines is expected to be limited in intensity and extent. Operational noise exceeding the 120 dB re 1 µPa behavioral disturbance threshold would be limited to within approximately 35 to 165 feet of each turbine (per NOAA 2018), although detectable noise above ambient levels could extend up to approximately 1,200 feet. The Proposed Action combined with all existing and planned future actions would place over 3,000 noise-generating structures in the RI/MA and MA WEAs. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. However, the 120 dB re 1 µPa threshold may not adequately represent the potential for adverse effects of chronic noise exposure (e.g., Cholewiak et al. 2018; Hatch et al. 2012; Jensen et al. 2009; Putland et al. 2017). While the potential for broader effects is unclear, BOEM concludes that the cumulative effects of low-level operational noise could raise to the level of **minor** adverse for certain marine mammal species.

Presence of structures: BOEM estimates a cumulative total of up to 3,110 offshore WTGs and OSS foundations in the GAA for marine mammals between 2022 and 2030. This total comprises foundations from the Proposed Action and up to 3,008 foundations associated with existing (BIWF) and planned state and federal offshore wind energy projects on the OCS between North Carolina and Maine (see Appendix E3, Table E3-1).

Project construction is likely to result in short-term displacement effects on marine mammals from the areas affected by disturbance from vessel activity, foundation installation, HRG surveys, and related activities. Several projects are expected to be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. BOEM anticipates that the construction schedules for future wind projects would employ the same types of timing restrictions to protect NARW as those included in the Proposed Action, with modifications as needed to adapt to ongoing shifts in the seasonal distribution of this species (e.g., Davis et al. 2017, 2020). However, timing restrictions for NARW would not be protective for all marine mammal species. It is anticipated that future wind projects would also employ a similar range of EPMs to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from **negligible** to **moderate** adverse, varying by species.

BOEM anticipates that future wind projects within the RI/MA WEA would be constructed using 1 × 1–nm grid spacing, as does the Proposed Action. Foundations spaced at 1 × 1 nm are unlikely to pose a barrier to movement for even the largest marine mammal species. However, the broadscale development of offshore energy structures would introduce an extended network of biologically productive artificial reefs, most generating low levels of non-impulsive sound that are detectable to marine mammals within a few hundred feet. While the individual effects of each turbine would be **minor** adverse, the broader implications of these habitat changes for marine mammals are unclear. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. Given these uncertainties, the potential for displacement effects is unknown, but there is currently no basis to conclude that these impacts would result in moderate to major adverse long-term effects on any species.

The abundance of fish and invertebrate prey resources created by the artificial reef effect are likely to attract predatory marine mammals, particularly seals (e.g., Russel et al. 2014) and potentially dolphins and porpoises. Increased fish biomass around the structures could attract commercial and recreational fishing activity, leading to increased interactions between humans and marine mammals. BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures, reducing associated risks to marine mammals.

The new wind energy structures would also cause hydrodynamic effects. The GAA is characterized by strong seasonal stratification, conditions that tend to limit the hydrodynamic influence of individual foundation structures (van Berkel et al. 2020). As discussed in the previous section, the Proposed Action is not anticipated to result in additive hydrodynamic effects. However, broader scale development of contiguous projects could have more extensive effects. For example, Afsharian et al. (2020) modeled the potential effects from installation of over 400 offshore wind turbines in Lake Erie and determined that their cumulative effect on wind energy could disrupt circulation patterns and affect seasonal stratification and water temperatures over broad scales. However, these findings may not be applicable to the open ocean where circulation patterns are strongly influenced by tides and ocean currents.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 × 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms potentially impacting the distribution of larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the GAA. Therefore, at this time, there is no basis to conclude that the cumulative hydrodynamic impacts of Proposed Action in combination with planned and foreseeable future actions would have a measurable effect on marine mammals and their prey and forage species.

In summary, the cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, could be beneficial or adverse, could range from **negligible** to **moderate** adverse, and are likely to vary considerably by species. Although the type and magnitude of effect from displacement and shifts in prey resources due to the presence of structures are largely unknown and would vary by species, the possibility of changes in distribution relative to commercial fishing activity and increased interaction with fishing gear poses the potential for increased risk of entanglement. Should such changes occur, increased risk of entanglement would constitute a **minor** to **moderate** adverse effect on

marine mammals, varying by species and population status, because this stressor is a documented source of injury and mortality. In the case of NARW, the potential for increased exposure to entanglement could pose a significant risk as injury or mortality that removes even one juvenile or reproductive age individual from the population would constitute a **major** effect. It is important to stress that the likelihood of this level of effect is unclear because it is not known if the presence of structures would displace NARW and whether displacement would lead to increased fishing gear exposure. These potential long-term impacts would persist until decommissioning is complete and structures are removed. EPMs would help to offset the potential impact of entanglement within derelict fishing gear or marine debris.

Vessel traffic: BOEM estimates that, cumulatively, up to 380 construction vessels could be active within the GAA between 2022 and 2030. As discussed above for Project construction, the majority of vessel operations would occur at speeds of less than 10 knots. In addition, BOEM anticipates that future projects would adhere to mandatory and voluntary vessel speed restrictions in posted DMAs and Seasonal Management Areas and would implement EPMs and proposed mitigation measures similar to those described for the Proposed Action (see Appendix F, Table F-1) to avoid marine mammal collisions. BOEM has concluded that these measures would effectively avoid all but **minor** adverse impacts on sensitive species such as NARW but may not eliminate risks of **moderate** adverse impacts to other marine mammal species. Therefore, the cumulative effects of increased vessel traffic on marine mammals would range from **minor** to **moderate** adverse.

3.15.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact marine mammals through exposure to vessel traffic, underwater noise impacts, and permanent habitat conversion. Individual marine mammals could be injured by vessel collisions and underwater noise exposure during Project construction. Reef effects created by the presence of offshore wind structures could beneficially increase foraging opportunities for species that forage on fish.

On this basis, BOEM anticipates that the Proposed Action would result in **negligible** to **moderate** adverse impacts for most marine mammal species. Due to the population status of NARW, underwater noise from impact pile driving could have a **major** adverse effect on the species. However, timing restrictions and other EPMs specifically intended to avoid adverse effects on NARW and marine mammals in general would avoid adverse impacts on NARW. As such, the overall impact of the Proposed Action alone on marine mammals would be **moderate** adverse.

Collectively, BOEM anticipates that the overall impacts associated with the Proposed Action, when combined with past, present, and reasonably foreseeable activities, would result in notable and measurable impacts on marine mammals. Impacts to some individuals could persist after Project decommissioning, but they would not prevent full recovery of the species. These findings would constitute a **moderate** adverse impact on marine mammals in the GAA.

3.15.2.3 Alternatives C, D, E, and F

3.15.2.3.1 Construction and Installation

Offshore Activities and Facilities

Noise: Construction of Alternatives C through F would result in similar underwater noise impacts on marine mammals to those described for the Proposed Action in Section 3.15.2.2.1, but those impacts would be reduced in extent and duration because fewer structures would be installed. Reducing the number of structures could also reduce the required extent of HRG surveys relative to the Proposed Action, but BOEM has insufficient information to determine if this is the case. The RWEC configuration would remain the same across all alternatives, and the probable area of occurrence within the RWF is sufficiently large that it is not possible to determine how changes in alternative configuration would affect the likelihood of UXO encounters. Therefore, impacts to marine mammals from HRG surveys and UXO detonation are considered to be the same across all alternatives.

Differences in extent and duration of potential noise exposure from impact pile driving activities between the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Tables 3.15-10 through 3.15-12. These tables display the number of structures installed and estimated days of pile-driving activity required to construct each alternative. Extent and duration of potential noise exposure are proportional to the number of WTGs proposed; fewer WTGs would result in a smaller extent and shorter duration of impacts. For example, the two configurations of Alternative C and Alternative E1 would involve noticeably fewer days of pile driving than the Proposed Action and most configurations of Alternative D. While fewer individual marine mammals could be exposed to underwater noise impacts under these alternatives, the likelihood of at least some individuals being exposed to permanent injury remains. Accordingly, the impacts of this IPF would be noticeably reduced under these alternatives, the overall impacts would be similar in magnitude and general scale to those resulting from the Proposed Action. Adverse noise effects on marine mammals from each alternative for the duration of construction activities would likewise vary between species ranging from **minor** to **moderate** adverse. The potential use of larger capacity WTGs under Alternative F could result in more extensive operational noise impacts than the Proposed Action, but insufficient information is available to characterize differences in effect.

Table 3.15-10. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm Wind Turbine Generator Foundation Installation, Proposed Action, and Proposed Configurations for the Habitat Alternative*

Noise Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action	Alternative C1	Alternative C2
Peak injury	LFC	<33	100 sites/ 35 days	64 sites/ 22 days	65 sites/ 22 days
	MFC	–			
	HFC	525			
	Phocids	–			
Cumulative injury	LFC	4,954–8,727			
	MFC	0–66			
	HFC	4,396			
	Phocids	787–1,444			
TTS and behavioral effects	LFC	11,909–12,336			
	MFC	0–12,041			
	HFC	11,877			
	Phocids	11,909–12,467			

* Installation scenario for a 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites during summer conditions.

Table 3.15-11. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG Foundation Installation, Proposed Action, and Proposed Configurations for the Transit Alternative*

Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action	Alternative D1	Alternative D2	Alternative D3	Alternative D1+D2	Alternative D1+D3	Alternative D2+D3	Alternative D1+D2+D3
Peak injury	LFC	<33	100 sites/ 35 days	93 sites / 31 days	92 sites/ 31 days	93 sites/ 31 days	85 sites/ 28 days	86 sites/ 29 days	85 sites/ 28 days	78 sites/ 26 days
	MFC	–								
	HFC	525								
	Phocids	–								
Cumulative injury	LFC	4,954–8,727								
	MFC	0–66								
	HFC	4,396								
	Phocids	787–1,444								
TTS and behavioral effects	LFC	11,909–12,336								
	MFC	0–12,041								
	HFC	11,877								
	Phocids	11,909–12,467								

* Installation scenario for a 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

Table 3.15-12. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) by Marine Mammal Hearing Group from Revolution Wind Farm WTG Foundation Installation, Proposed Action, and Proposed Configurations for the Viewshed Alternative*

Noise Exposure Type	Hearing Group	Threshold Distance (feet)†	Proposed Action	Alternative E1	Alternative E2
Peak injury	LFC	<33	100 sites/ 35 days	64 sites/ 21 days	81 sites/ 27 days
	MFC	–			
	HFC	525			
	Phocids	–			
Cumulative injury	LFC	4,954–8,727			
	MFC	0–66			
	HFC	4,396			
	Phocids	787–1,444			
TTS and behavioral effects	LFC	11,909–12,336			
	MFC	0–12,041			
	HFC	11,877			
	Phocids	11,909–12,467			

* Installation scenario for a 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

3.15.2.3.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternatives C through F would result in similar impacts to marine mammals as those described for the Proposed Action in Section 3.15.2.2.2, but those impacts would be reduced in extent and would vary depending on the alternative selected. Refer to Tables 3.6-17 through 3.6-19 in Section 3.6.2.4.2 for a summary of the number of structures under each proposed configuration of Alternatives C through F. As stated, Alternative F would employ one of the proposed configurations of Alternatives C through E using higher capacity WTGs. Aside from increased WTG capacity, all other features and impacts of Alternative F would be the same as those described for the selected configuration.

Over the life of the Project, the WTG and OSS foundations and associated scour protection would alter the offshore environment inhabited by marine mammals. Their presence could affect marine mammal behavior and indirectly affect the distribution and abundance of prey and forage species; however, the significance of these effects are difficult to determine and likely to vary by species. In contrast, hydrodynamic effects from the presence of structures could alter the distribution of zooplankton and forage fish resources for baleen whales, leading those species to alter foraging patterns in response. These effects would likely influence the distribution of marine mammal forage species at a broad scale, but as discussed in Section 3.15.2.2.2, shifts in forage abundance and distribution would be expressed at smaller scales within this broader range. There is no basis to conclude that hydrodynamic effects would negatively affect the abundance and availability of prey species for marine mammals. The presence of structures and localized changes in forage species distribution could theoretically lead to displacement some marine mammal species and the potential for increased interaction with fisheries. Should such effects occur, they could lead to greater than negligible impacts on certain marine mammal species. However, insufficient information is available to determine if displacement effects are likely to occur and whether those effects would be biologically significant.

Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). For example, both configurations of Alternative C and Alternative E1 propose noticeably fewer WTG and OSS foundations compared to the Proposed Action and most configurations of Alternative D. Therefore, these alternatives would be expected to produce noticeably reduced impacts from this IPF by comparison. In general, presence of structures effects on marine mammals under Alternatives C through F would likely be less extensive compared to those resulting from the Proposed Action. Reef effects would be reduced commensurate with the number of foundations constructed under each alternative configuration. At present, insufficient information is available to determine if differences in Project configuration between alternatives, specifically where foundations are located relative to sensitive benthic habitats, would contribute to a measurable difference in reef effects on marine mammals beyond those resulting from a simple reduction in the number of structures. As stated in Section 3.15.2.2.3, hydrodynamic effects are likely to lead to localized changes in the distribution of phytoplankton and forage fish prey for some marine mammal species, but these changes are unlikely to be biologically significant. Therefore, while Alternatives C through F would likely alter and reduce the extent of measurable hydrodynamic effects, those effects are likely to remain biologically insignificant. Following decommissioning and removal of the structures

from the water column, the habitat would be expected to recover to conditions comparable to the environmental baseline for the surrounding habitats.

While certain alternative configurations would result in a noticeable reduction in the number of structures in the marine environment, it is not clear that this would result in a biologically significant difference in the effects of this IPF relative to the Proposed Action. It is not currently known if the presence of structures would result in displacement effects; therefore, it is not possible to determine if reducing the number of structures and altering their configuration would reduce displacement effects. Therefore, while Alternatives C through F would reduce the extent of reef and hydrodynamic effects, the overall impacts to marine mammals would be similar in magnitude and general scale to those resulting from the Proposed Action. On this basis, impacts from the presence of structures on marine mammals for Alternatives C through F are expected to range from **negligible** adverse to **minor** beneficial for the life of the Project, varying by species.

3.15.2.3.3 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact marine mammals through the same mechanisms described for the Proposed Action, including increased vessel activity, underwater noise, and permanent habitat conversion. Individual marine mammals could be injured by vessel collisions and underwater noise exposure during Project construction. While the overall extent of impacts to marine mammals would be reduced under Alternatives C through F relative to the Proposed Action, the significance of those effects would be the same. Therefore, the impacts of the Alternatives C through F alone on marine mammals would be **moderate** adverse. When combined with past, present, and reasonably foreseeable activities, BOEM anticipates that the overall impacts of the Alternatives C through F would be **moderate** adverse for marine mammals in the GAA.

3.15.2.4 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are listed in Appendix F, Table F-2 and addressed here in more detail (Table 3.15-13).

Table 3.15-13. Proposed Mitigation Measures – Marine Mammals

Mitigation Measure	Description	Effect
Marine debris	Appropriate actions (e.g., training, marking, reporting) would be taken to minimize the potential for the introduction of trash and debris into the marine environment.	This measure would complement existing EPMs and regulatory requirements, ensuring that impacts from the accidental releases and discharges IPF would remain negligible adverse.

Mitigation Measure	Description	Effect
Incorporate Letter of Authorization (LOA) requirements	The final MMPA LOA for Incidental Take Regulations would be incorporated into COP approval, and BOEM and/or BSEE will monitor compliance with these measures.	This measure would not modify impact determinations on marine mammals but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
PSO coverage	BOEM, BSEE, and the USACE would ensure that PSO coverage is sufficient to reliably detect marine mammals and sea turtles at the surface in clearance and shutdown zones to execute any pile-driving delays or shutdown requirements.	This measure would not modify impact determinations on marine mammals but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Passive acoustic monitoring	Revolution Wind will prepare a PAM plan to record ambient noise and marine mammal vocalizations in the Lease Area. Acoustic monitoring will be implemented prior to and throughout the construction period and will continue for at least 2 years of Project operations after construction is complete. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during constructions and also meet postconstruction monitoring needs. Underwater acoustic monitoring will use standardized measurement methods and data processing and visualization metrics developed for the Atlantic Deepwater Ecosystem Observatory Network for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu). At least two PAM buoys will be independently deployed within or bordering the RWF Lease Area, or one or more buoys will be deployed in coordination with other acoustic monitoring efforts in the RI and MA lease areas.	This measure would not modify the impact determination for construction and operational noise effects on marine mammals but would improve understanding of these impacts on specific resources and inform future management and mitigation measures.
Sound field verification	Revolution Wind would develop a sound field verification plan and submit to BOEM, the USACE, and NMFS for review and written approval at least 90 days prior to initiating underwater noise–producing construction activities. The sound field verification would provide the basis for established pre-start clearance and shutdown zones.	This measure would not modify the impact determination for noise effects on marine mammals (minor to moderate adverse) but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

Mitigation Measure	Description	Effect
Shutdown zone and clearance zone adjustment	BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial sound field verification measurements. If initial measurements indicate distances to the isopleths are greater than predicted by modeling, Revolution Wind will implement additional sound attenuation measures prior to conducting additional pile driving.	This measure would not modify the impact determination for noise effects on marine mammals (minor to moderate adverse) but would help to ensure that these effects do not exceed the levels analyzed herein.
Pile driving monitoring	Revolution Wind will prepare a pile-driving monitoring plan in coordination with the PAM plan. PAM data would be used to determine potential marine mammal presence in the vicinity of Project activities. Revolution Wind will provide sufficient PSO coverage to reliably detect marine mammals within established clearance and shutdown zones. PSOs must have effective visual monitoring of all clearance zones in all directions prior to the commencement of pile driving.	This measure would not modify the impact determination for noise effects on marine mammals (minor to moderate adverse) but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Vessel communication	Visual observations of marine mammals will be communicated to all Project vessels to coordinate implementation of related EPMs and mitigation measures.	This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related displacement effects on marine mammals (minor to moderate adverse), it would help to ensure that these effects do not exceed the levels analyzed herein.
Vessel strike avoidance plan measures	BOEM will require Revolution Wind to comply with measures and reporting outlined in the final vessel strike avoidance plan per the MMPA ITR LOA.	This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related displacement effects on marine mammals (minor to moderate adverse), it would help to ensure that these effects do not exceed the levels analyzed herein.
Vessel speed restriction	All vessels, regardless of size, would comply with a 10-knot speed restriction in any SMA, DMA, or Slow Zone.	This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related displacement effects on marine mammals (minor to moderate adverse), it would help to ensure that these effects do not exceed the levels analyzed herein.

Mitigation Measure	Description	Effect
Gear management	Sampling or survey gear would be regularly maintained and monitored to limit the potential for entanglement. Gear would be uniquely marked, and all reasonable efforts would be undertaken to recover lost gear.	This measure would complement existing EPMs and ensure that entanglement risk associated with FRMP survey activities and potential impacts on marine mammals remain negligible.
Reporting	All sightings of NARW will be reported to BOEM and NMFS, as specified in Table F-2. Additionally, BOEM and BSEE would ensure that Revolution Wind submits regular (e.g., monthly) reports to document the amount of extent of take that occurs during all phases of the Proposed Action.	This measure would not modify the impact determination for any IPF but would contribute to improved understanding of marine mammal use of the RWF and vicinity.

3.16 Navigation and Vessel Traffic

3.16.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Navigation and Vessel Traffic

Geographic analysis area: The GAA for navigation and vessel traffic impacts includes the Lease Area, all other wind energy lease areas (for the cumulative effects analysis), and the bays surrounding each of the ports listed in Section 3.11 as being potentially used by the Project during construction or operations, as shown in Figure 3.16-1.

In Figure 3.16-1, "Wind Farm Ports (Listed in the COP)" are those potentially used for construction or operations activities, including WTG tower, nacelle, and blade storage; pre-commissioning and marshalling; foundation marshalling and advanced foundation component fabrication; and construction hub and/or O&M activities (see COP Table 3.3.10-1). "Commercial Fishing Only" refers to those ports identified as commercial fishing or for-hire recreational fishing ports, as discussed in Section 3.11.

The other wind energy lease areas considered in the cumulative analysis include the following RI/MA WEA and MA WEA Lease Areas: OCS-A 0487, OCS-A 0500, OCS-A 0501, OCS-A 0517, OCS-A 0520, OCS-A 0521, and OCS-A 0522. See Table E-3 in Appendix E for more information.

Affected environment: The NSRA (DNV GL Energy USA, Inc. 2020) analyzed all vessels with Automatic Identification System (AIS) data[36] using data for July 1, 2018, through June 30, 2019, supplemented with vessel monitoring system (VMS) data for calendar year 2016, density maps, the final USCG (2020) report *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (MARIPARS), and stakeholder input (DNV GL Energy USA, Inc. 2020). The assessment used a 5-mile radius around the Project to determine the vessel types transiting in the area during this time period and evaluation incidents; AIS data suggest that primarily only fishing and other/unidentified vessels currently transit within the Lease Area.

[36] AIS data cover those vessels that are required to carry a transponder—or that choose to carry one—according to AIS requirements at 33 CFR 164.01, 164.02, 164.46, and 164.53. Most smaller vessels are not covered in the data. AIS data underestimate the scale of commercial fishing vessel activities, as transponders are only required for vessels over 65 feet and can be turned off after 12 nm. See Section 3.9 for a discussion of VMS data used for commercial fishing vessels.

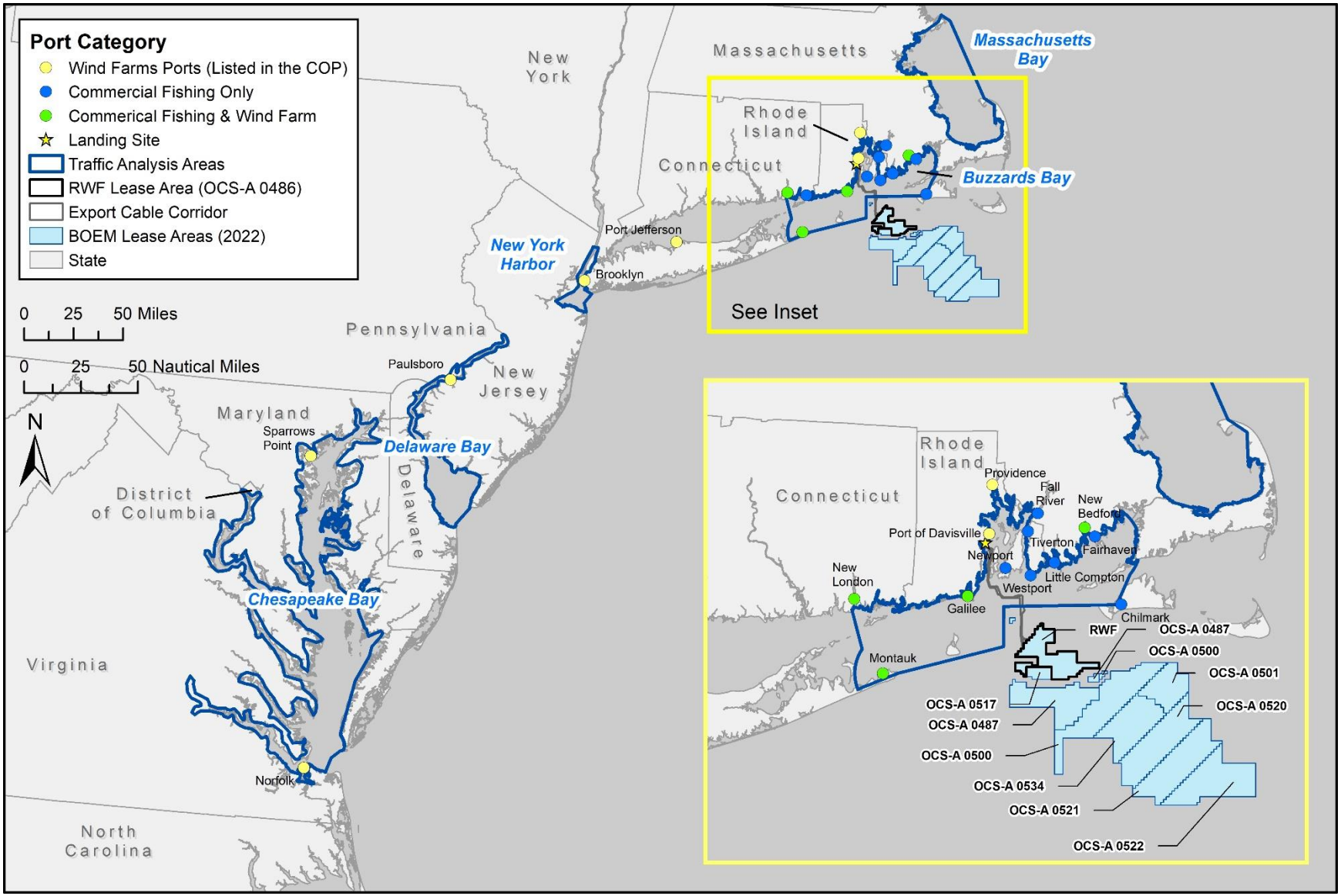

Figure 3.16-1. Geographic analysis area for navigation and vessel traffic.

MARIPARS analyzed AIS data within the leased areas of the RI/MA WEA and MA WEA (study area) shown in Figure 3.16-1[37] (USCG 2020:Figure 3). The MARIPARS study found 13,000 to 46,900 annual vessel transits through the study area. Activity during the summer months was quadruple that of January and February. The study concluded that vessel activity in the study area was largely commercial fishing. Fishing vessels primarily originated from several ports in Rhode Island, Massachusetts, or New York and transited the study area to reach fishing grounds and other areas southeast of the study area. Recreational vessels were more expected to transit within the structure arrays and less expected to use USCG designated routes. Passenger vessels largely did not transit the study area. Deep draft and towing vessels transited the study area, mostly on the west side, and tug and towing vessels had a low frequency of transit in the study area. MARIPARS did not evaluate other and unidentified vessels, although many appeared to be misclassified fishing vessels.

AIS data for 2019 (Office for Coastal Management [OCM] 2020) were further analyzed to measure the time and distance that vessels spent within the Lease Area. In 2019, vessels traveled 42,424 miles in the Lease Area. The majority of miles are attributed to fishing vessels, which accounted for 39% of all vessel miles traveled. Pleasure craft accounted for 6% of miles (Table 3.16-1). Table 3.16-2 summarizes activity in the basins in the GAA, as measured by miles traveled. Chesapeake Bay had the most activity, and pleasure craft/sailing vessels were the most common vessel there. New York Harbor was the second busiest, with passenger vessels contributing more than half of the activity. Tug tow vessels accounted for a substantial number of miles traveled in Chesapeake Bay, New York Harbor, and Delaware Bay (each with more than 500,000 miles traveled). Fishing vessels had the most activity in Buzzards Bay. Deep draft vessels accounted for very little of the activity; the largest contribution was in Chesapeake Bay, with 537,000 miles of 3,775,000 miles total.

Table 3.16-1. Distance Vessels Traveled inside Lease Area (miles)

Vessel Type	Revolution Wind Lease Area	Other Contiguous Rhode Island/Massachusetts Wind Energy Area Lease Areas*
Cargo	208	3,127
Fishing	16,336	84,599
Not available	10,700	11,789
Other	12,173	18,744
Passenger	498	2,208
Pleasure craft/Sailing	2,363	6,137
Tanker	97	4,054
Tug tow	49	529
Total	**42,424**	**131,188**

Source: OCM (2020).

* Refer to Figure 1.1-2 for location of the RI/MA WEA.

[37] MARIPARS includes the following BOEM lease areas in the RI/MA and MA WEAs: OCS-A 0486 (now subdivided as OSC-A 0517 and OCS-A 0486 [RWF]), OCS-A 0487, OCS-A 0500, OCS-A 0501, OCS-A 0520, OCS-A 0521, and OCS-A 0522. See Table E-3 in Appendix E for more information.

Table 3.16-2. Distance Vessels Traveled inside Basins (thousands of miles)

Port	Cargo	Fishing	Not Available	Other	Passenger	Pleasure Craft/Sailing	Tanker	Tug Tow	Total
Buzzards Bay	30	312	115	93	328	654	21	256	1,810
Chesapeake Bay	537	108	233	278	367	1,179	41	1,030	3,775
Delaware Bay	248	16	125	77	165	92	108	554	1,386
Maine	2	42	2	3	6	35	4	5	99
Massachusetts Bay	23	68	137	83	409	233	21	227	1,200
New York Harbor	79	4	517	117	1,991	152	40	563	3,464

Source: Developed using OCM (2020).

Figures 3.16-2 and 3.16-3 show close-up views of the Project with vessel traffic (based on AIS data). Tanker cargo vessels and tug and towing vessels generally travel in the internationally designated traffic separation schemes to the north and west of the Lease Area. These vessels can approach or exit the Narragansett Bay traffic separation scheme in a northwest–southeast orientation, leading some to transit through the Lease Area. East of and at the approximate latitude of Old Harbor, cargo vessels diverge from the north–south traffic lanes, and some transit through the Lease Area. Passenger vessels, typically ferries or cruise ships, generally avoid the Lease Area and would often follow a similar route. The Lease Area is located outside the designated lanes used by most commercial vessel traffic.

Fishing vessels operate all over the region, sometimes fishing and often transiting, with their vessel movements recorded through AIS, VMS, or not at all (see Section 3.9.1). Relative to the areas closer to the coast and traffic lanes, there is less vessel traffic near the Lease Area.

The NSRA modeled vessel incident data, showing no collisions or allisions in the Lease Area and estimating a total of 0.7543 collisions per year and no allisions in the NSRA's study area, which included the Lease Area (DNV GL Energy USA, Inc. 2020:Table E-6). The results of the model show that fishing vessels would experience the most frequent rate of incidents, accounting for nearly all of the collisions, at 0.7325 per year.

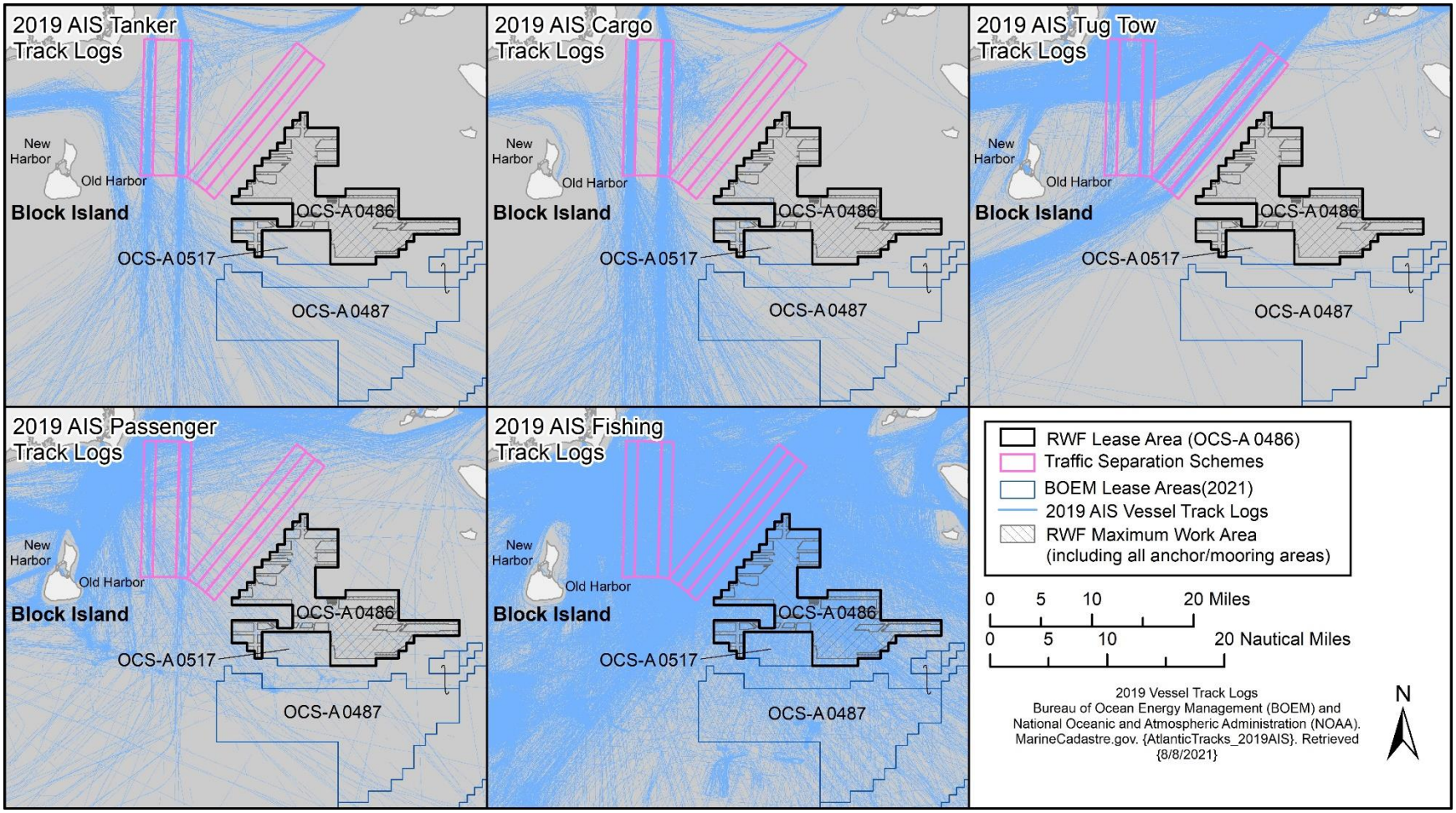

Figure 3.16-2. Vessel traffic near the Lease Area.

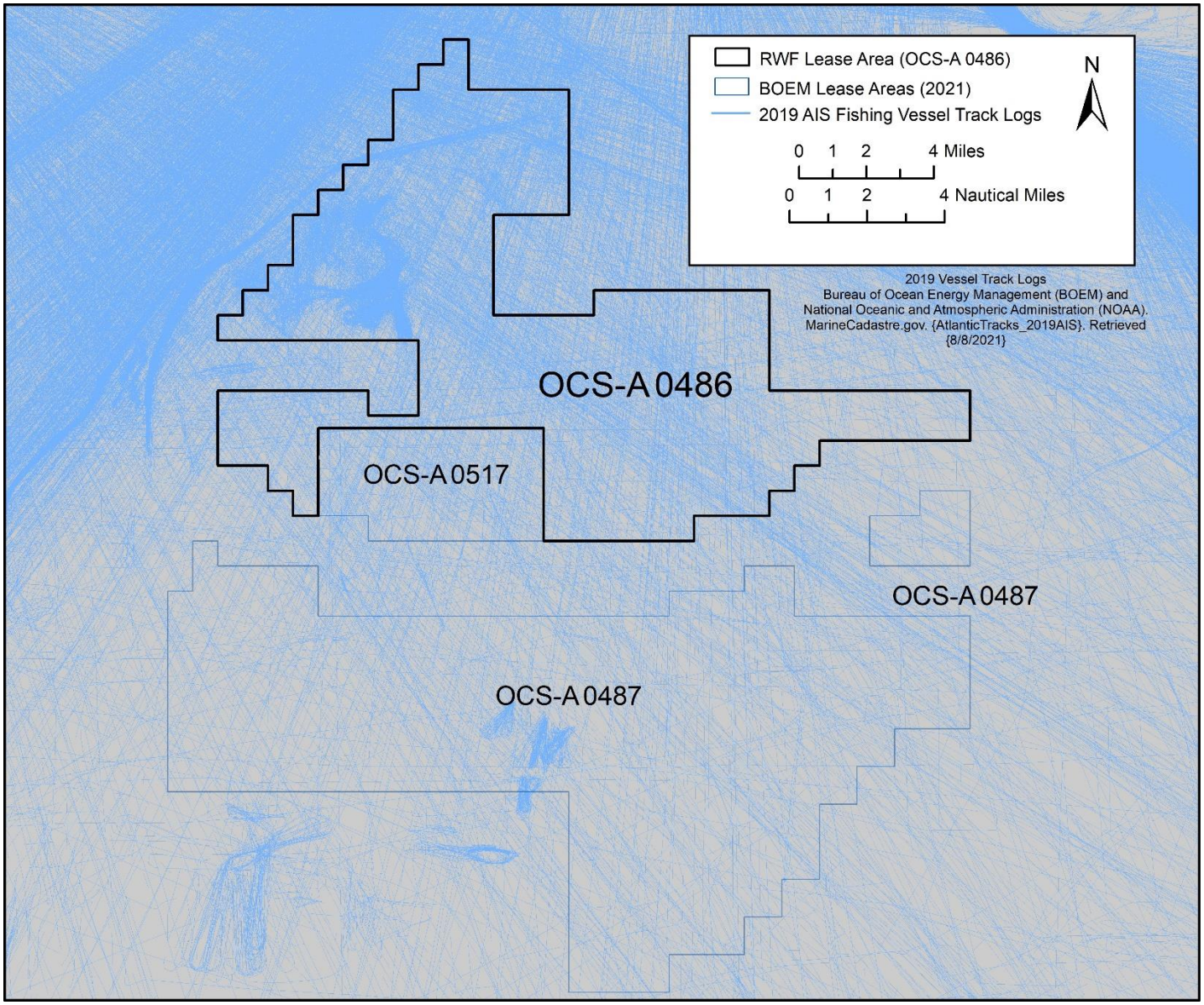

Figure 3.16-3. Detail of fishing vessel traffic near the Lease Area.

3.16.1.1 Future Offshore Wind Activities (without Proposed Action)

3.16.1.1.1 Offshore Activities and Facilities

This section discloses potential navigation impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Anchoring and new cable emplacement/maintenance: BOEM estimates approximately 2,148 acres of seafloor would be disturbed by anchoring associated with offshore wind activities. Anchoring vessels used in the construction of offshore wind energy projects would pose a navigational hazard to vessels. Although anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Therefore, the effects of offshore wind energy–related anchoring on commercial fisheries and for-hire recreational fishing are expected to be short term **minor** adverse.

Future offshore wind developers are expected to coordinate with the maritime community and the USCG to avoid laying export cables through any traditional or designated lightering/anchorage areas, meaning that any risk for deep draft vessels would come from anchoring in an emergency scenario, specifically in or near the Buzzards Bay and Narragansett Bay traffic separation schemes. Generally, larger vessels accidently dropping anchor on top of an export cable (buried or mattress protected) to prevent drifting in the event of vessel power failure would result in damage to the export cable, risks to the vessel associated with an anchor contacting an electrified cable, and impacts to the vessel operator's liability and insurance. Impacts on navigation and vessel traffic would be temporary localized **minor** adverse, and navigation and vessel traffic would fully recover following the disturbance.

Under the No Action Alternative, up to 4,209 miles of cable could be installed in the contiguous RI/MA WEA and Massachusetts Wind Energy Area (MA WEA) lease areas to support future offshore wind projects (see Figure 1.1-2 for location of RI/MA and MA WEAs). Offshore cable emplacement would have temporary localized **minor** adverse impacts on boating because vessels would need to navigate around work areas, and some boaters would prefer to avoid the noise and disruption caused by installation.

Port utilization: Construction and operation of improvements at various ports in support of reasonably foreseeable offshore wind projects could coincide with the forecasted port improvements listed in Appendix E, some of which are intended to directly support offshore wind energy development. Port improvements could increase vessel congestion and stress port capacity during construction, leading to temporary localized **minor** to **moderate** adverse impacts based on how the different projects manage their port utilization. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to ports.

Presence of structures: Using the assumptions in Appendix E3, future offshore wind energy projects under the No Action Alternative would include 1,036 foundations. The placement of these structures in the contiguous RI/MA WEA and MA WEA lease areas would have long-term adverse impacts on vessels through the risk of allision, navigation hazards, space-use conflicts, the presence of cable infrastructure, and visual impacts. While lease areas are generally located in low vessel traffic areas, they do receive

some use. Table 3.16-1 summarizes the miles traveled by vessels within the Lease Area and other lease areas in 2019.

The presence of offshore wind structures would increase the GAA's navigational complexity, thereby increasing the risk of allision or collision. Deep draft, tug, and towing vessels would need to minimally divert to avoid traveling near structures. Vessels that generally travel within and through lease areas could require an adjustment of navigation practices. The attraction of artificial reef effects would increase vessel congestion and the risk of allision, collision, and spills near structures. BOEM assumes that all offshore wind developments in the GAA would use the developer-agreed-upon 1 × 1–nm spacing in fixed east–west rows and north–south columns and would evaluate each of those individual projects in their respective NEPA analyses. Because this layout supports traditional east–west active fishing operations, this arrangement would reduce, but not eliminate, navigational complexity and space-use conflicts during the operations phases of the projects.

Vessel traffic: Applying vessel activity estimates developed by BOEM based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019) and applying construction vessel activity estimates presented in *Vineyard Wind I Offshore Wind Energy Project Final Environmental Impact Statement Volume I* (BOEM 2021), if construction of the Project does not occur, vessel activity could peak in 2025, with as many as 276 vessels involved in the construction of reasonably foreseeable projects (Table 3.16-3).

Table 3.16-3. Cumulative Construction and Operations Vessels from Future Activities

Vessels	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Average construction vessels	1	0	72	131	150	23	10	10	10	10
Maximum construction vessels	1	0	132	240	276	42	18	18	18	18
Average operations vessels	1	1	1	3	9	14	15	15	15	15
Maximum operations vessels	1	1	1	9	25	40	43	45	45	45
Average daily vessels, total	2	1	73	134	159	37	25	25	25	25
Maximum daily vessels, total	2	1	133	249	301	82	61	63	63	63

Source: Developed using offshore wind projects listed in Table E-1 in Appendix E and estimates of average (maximum) daily vessels per foundation of 0.245 (0.451) for construction and 0.010 (0.029) for operations from BOEM (2021).

Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. Other reasonably foreseeable future offshore projects would produce additional vessel traffic during

construction, but because of their timing, they are not anticipated to use the same traffic routes. Construction of other offshore wind projects are anticipated to be scheduled to minimize overlapping construction periods and reduce the number of construction vessels in operation at any given time, effectively reducing the cumulative impact on port congestion and construction vessel rerouting. As a whole, this level of traffic activity would represent a long-term overall but temporary **minor** to **moderate** adverse impact on individual ports and a **minor** to **moderate** adverse impact to navigation under the No Action Alternative because the construction would be located outside major shipping lanes and the number of vessels would be small compared to the overall level of traffic near each of the potential developments.

Cumulative impacts during O&M of reasonably foreseeable offshore wind projects (see Table 3.16-3) would also represent a long-term **minor** adverse impact to navigation due to the smaller number of vessels and lower frequency of activities (growing to an average of 42 vessel trips per day by 2028). Decommissioning of each of the projects is anticipated to have cumulative impacts similar to those experienced during construction. All reasonably foreseeable offshore wind projects would be required to prepare an NSRA in compliance with the guidelines in USCG NVIC 01-19 (USCG 2019), which would serve to minimize impacts to marine navigation.

3.16.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on navigation associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term minor to moderate impacts on navigation, primarily through existing traffic activity, port use, and the presence of structures.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities, especially the presence of structures, port utilization, and vessel traffic, would be long term minor to moderate adverse. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would also be long term minor to moderate adverse. Future projects would increase vessel activity, which could lead to congestion at affected ports, the possible need for port upgrades beyond those currently envisioned, and an increased likelihood of collisions and allisions, with a resultant increased risk of accidental releases. In addition, the presence of new structures would also increase the risk for collisions, allisions, and resultant accidental releases and threats to human health and safety.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in long-term **minor** to **moderate** adverse impacts because the overall effect would be notable, but vessels would be able to adjust to account for disruptions and EPMs would reduce impacts.

3.16.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). If Revolution Wind implements a less impactful scenario within the PDE, smaller amounts of construction or infrastructure development would result in lower impacts but would not likely result in different impact ratings than those described below.

The relevant design parameters for impacts to navigation and vessel traffic are the number and layout of WTGs and OSSs (i.e., the presence of structures) within the Lease Area. If the number of structures is reduced, the change in impact would be based on the location of the WTGs removed. Removal of rows or columns of structures would have the greatest change in impacts due to the increased navigation space created. Removal of select structures not organized in rows or columns would have less of an impact due to the navigational constraints and layout of the remaining grid pattern. Changes to the layout that move away from a standard 1 × 1–nm grid would increase the navigational complexity and the risk of incidents, including collisions, allisions, and accidental releases.

See Appendix E1 for a summary of IPFs analyzed for navigation and vessel traffic across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Table E2-13 in Appendix E1.

Table 3.16-4 provides a comparison of all evaluated IPFs for navigation and vessel traffic across alternatives. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination.

Under all of the options overall impact to navigation and vessel traffic from any alternative would be long term **moderate** adverse, as impacts would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.16-4. Alternative Comparison Summary for Navigation and Vessel Traffic

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Anchoring and new cable emplacement/ maintenance	**Offshore**: Anchoring vessels used in the construction of offshore wind energy projects would pose a navigational hazard to vessels. Although anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and decommissioning. All impacts would be localized (within a few hundred yards of an anchored vessel) and temporary (hours to days). Impacts on navigation and vessel traffic would be temporary localized **minor** adverse, and navigation and vessel traffic would fully recover following the disturbance. Offshore cable emplacement would have temporary localized **minor** adverse impacts on boating because vessels would need to navigate around work areas, and some boaters would prefer to avoid the noise and disruption caused by installation.	**Offshore**: The Project would have no impact on ordinary anchoring activity in the area. The Project may have some impact on anchoring near the cable route, provided that a vessel might need to anchor in an emergency. Cable laying would have a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area during construction. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse. BOEM estimates a total of 12,196 acres of anchoring and mooring-related disturbance and 19,336 acres of seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the contiguous RI/MA WEA lease areas. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic.	**Offshore**: Alternatives C through F would reduce the IAC proportionally based on the number of WTGs but would still require cables to connect the extent of the WTGs. The construction impacts from anchoring and new cable emplacement/maintenance would be similar to the Proposed Action. While the footprints would be reduced from that of the Proposed Action, ordinary anchoring activity would occur outside the Lease Area and not be affected. When combining any of the action alternatives (C–F) with the Proposed Action, anchoring and new cable emplacement/maintenance impacts during construction and installation could be slightly reduced. However, this reduction would not result in a change of the overall impact conclusion when compared to that alternative by itself. Overall, there would be a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area from cable laying and a temporary **moderate** adverse impact on commercial fishing vessels. During operation, as with the Proposed Action, the Project would have no impact on ordinary vessel anchorage operations, although risks would still exist for emergency anchoring and vessels transiting the area at a reduced level due to the smaller footprints. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse. The alternatives would contribute to the cumulative impacts of offshore wind projects but to a lesser extent than the Proposed Action based on the alternative chosen. The change from Alternatives C through F would be negligible relative to all future activity in the contiguous RI/MA WEA lease areas and it is unexpected that Project cable installation would overlap with other project cable routes. When considered in combination with past, present, and other reasonably foreseeable projects the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic.			
Port utilization	**Offshore**: Construction and operation of improvements at various ports in support of reasonably foreseeable offshore wind projects could coincide with the forecasted port improvements listed in Appendix E, some of which are intended to directly support offshore wind energy development. Port improvements could increase vessel congestion and stress port capacity during construction, leading to temporary localized **minor** to **moderate** adverse impacts based on how the different projects manage their port utilization.	**Offshore**: Because of the small number of vessels involved with Project construction, any ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades; therefore, the impact to port operations or port congestion would be temporary **negligible** adverse. Any ports used by vessels conducting maintenance would have a long-term **negligible** adverse impact because ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades. Project port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects. Port activities could be delayed or ports could experience congestion or changes in utilization as a result of the overlap in construction activities. Therefore, the cumulative impacts of the Proposed Action when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization) with localized **minor** to **moderate** adverse impacts on port utilization.	**Offshore**: Alternatives C through F would reduce the number and duration of vessel activity. Therefore, construction impacts on port utilization would be reduced from the levels of the Proposed Action depending on the alternative chosen, but still temporary **negligible** adverse. Alternatives C through F would reduce the number and duration of vessels working on maintenance activity, although due to the vessels primarily working on-site, the change to port utilization would be negligible. Ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades. Therefore, Alternative C through F would have the same impact from port utilization as the Proposed Action: long term **negligible** adverse. Port upgrades and vessel activity associated with the Project could result in negligible impacts to navigation and vessel traffic. Alternatives C through F would require fewer construction vessels than the Proposed Action and would therefore reduce the potential impact on ports, reducing its share of cumulative impacts, depending on the alternative chosen. However, port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects, and a reduced footprint relative to the Proposed Action would not likely have much of an impact overall. The cumulative impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization), with localized **minor** to **moderate** adverse impacts on port utilization.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	**Offshore**: Using the assumptions in Appendix E3, future offshore wind energy projects under the No Action Alternative would include 1,036 foundations. The placement of these structures in the contiguous RI/MA WEA and MA WEA lease areas would have long-term adverse impacts on vessels through the risk of allision, navigation hazards, space-use conflicts, the presence of cable infrastructure, and visual impacts.	**Offshore**: Revolution Wind would implement temporary safety zones around the locations with active construction, develop a mariner communication plan, and limit construction activities to periods of good weather conditions (see Appendix F). This would minimize impacts from offshore RWEC construction. The impact would be temporary and increase from **negligible** to **moderate** adverse as structures are added. For vessels that generally travel within and through the Lease Area, a vessel's view could be obstructed for as much as 7.8 seconds. Because of the 1 × 1–nm spacing of the Project structures, the impact on visibility would be further reduced. The Project would use USCG-approved lighting to make nearby vessels aware of structure locations (see Appendix F for EPMs). The structures would not impact a mariner's ability to use navigation aids or the coastline as a reference for navigation. Overall, spacing and placement of the structures would result in a long-term **negligible** adverse impact to visibility and a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk. The Proposed Action would add up to 100 additional WTGs and two OSSs to the 1,036 structures present under the No Action Alternative, which would increase navigational complexity and therefore the risk of collision, allision, and potential spills. Additional structures could also interfere with marine radars and aircraft engaging in search and rescue efforts. However, the Proposed Action would account for 10% of the total future structures in the contiguous RI/MA WEA lease areas and would implement a 1 × 1–nm uniform north–south and east–west grid spacing, consistent with other contiguous RI/MA WEA lease areas. The cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominantly of impacts described under the No Action Alternative, which would represent a long-term **moderate** adverse impact on navigation and vessel traffic.	**Offshore**: As with the Proposed Action, Revolution Wind would implement temporary safety zones around the locations with active construction, develop a mariner communication plan, and limit construction activities to periods of good weather conditions. In addition to the reduced footprint, depending on the option(s) chosen, this would minimize impacts from offshore RWEC construction (see Appendix F). Due to controls in the working area, Alternatives C through F would have impacts slightly reduced but similar to that for the Proposed Action for the presence of structures: temporary and increasing from **negligible** to **moderate** adverse as structures are added. The removal of structures from the northern and northwestern sections of the Lease Area under Alternative E would, in particular, move construction activity away from areas with the greatest commercial fishing activity, resulting in a temporary impact on commercial fishing vessel navigation that would increase from **negligible** to **minor** adverse as structures are added during construction. Fishing activity would see the greatest reduction in impacts relative to the Proposed Action. During operations, Alternatives C through F would reduce the number of WTGs in the Lease Area, which would alleviate some navigational complexity in areas where WTGs are not present. Detailed analysis is provided in Section 3.16.2.3. Alternatives C through F would add to the 1,036 structures present under the No Action Alternative, which would increase navigational complexity; increase the risk of collision, allision, and potential spills; and potentially interfere with marine radar or aircraft conducting search and rescue efforts. See Section 3.17 (Other Uses) for a discussion of potential impacts to search and rescue efforts. The footprint of each alternative would have varying impacts on these activities based on other actions. Detailed analysis is provided in Section 3.16.2.3.			
Vessel traffic	**Offshore**: Vessel activity could peak in 2025, with as many as 276 vessels involved in the construction of reasonably foreseeable projects (see Table 3.16-3). Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. As a whole, this level of traffic activity would represent a long-term overall but temporary **minor** to **moderate** adverse impact on individual ports and a **minor** to **moderate** adverse impact to navigation under the No Action Alternative because the construction would be located outside major shipping lanes and the number of vessels would be small	**Offshore**: Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions. There would be a short-term **minor** adverse impact on deep draft, tug, and towing vessels and commercial fishing vessels would experience temporary **moderate** adverse impacts. Because of the small number of vessels involved in construction, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole. Maintenance would have a long-term **negligible to minor** adverse impact on navigation and vessel traffic because of the infrequent nature of monitoring and inspection. Maintenance would primarily impact commercial fishing and other vessels operating at the same time and place that maintenance is performed. Because of the low frequency of allision and collision incidents and Project EPMs, the expected risks to navigation would be long term **negligible** adverse. Decommissioning of the Project would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction. The Proposed Action would add as many as 61 construction vessels during construction in 2023 and 2024 to conditions under the No Action Alternative. BOEM estimates a peak of 380 vessels at sea on a daily basis due to offshore wind Project construction	**Offshore**: As with the Proposed Action, Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions. These impacts would be reduced proportionally with the smaller footprint on the chosen alternative due to a smaller area under construction. Alternatives D3 and E2 have a reduced potential for affecting vessel traffic by extending the buffer around and moving construction away from the traffic separation scheme. Likewise, the combinations of D1+D3 and D1+D2+D3 would have reduced potential for affecting vessel traffic. Construction of offshore components of the Project under Alternatives C through F would likely require less time than anticipated for the Proposed Action (see COP Section 3.2). The NSRA indicates the highest risk would be from smaller non-Project vessels operating close to construction and work vessels; this risk would be reduced based on the smaller footprint (DNV GL Energy USA, Inc. 2020). There would be a temporary (for the duration of construction activities) minor adverse impact on smaller vessels, which would need to reroute around the Project. Commercial fishing vessels would experience temporary moderate adverse impacts. However, because of the small number of vessels involved in construction and due to controls in the working area, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	compared to the overall level of traffic near each of the potential developments. The vessels impacted under this alternative would be primarily commercial fishing and other types of vessels that have historically transited to and operated within or near each of the potential developments.	and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be short term **minor** adverse.	Operational impacts to navigation would be reduced from the Proposed Action in vessel traffic, though not meaningfully so, due to the decreased footprint of Alternatives C through F and removal of structures from the trafficked areas. All alternatives would still be located within the Lease Area and would primarily affect vessels that normally would be present, in particular, fishing vessels. Most vessel transits would take place outside the Lease Area; impacts due to the presence of structures are addressed above. Overall, the net effect is that Alternatives C through F would have the same impact from vessel traffic as the Proposed Action: long term **negligible** adverse. Decommissioning of the Project under Alternatives C through F would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction because decommissioning would use similar numbers of vessels and implement the same EPMs. After the Project is decommissioned, the navigation conditions in the area would return to pre-Project conditions pursuant to 30 CFR 585.910. Alternatives C through F would add construction vessels in 2023 and 2024 to conditions under the No Action Alternative at a level proportionally lower than the maximum-case scenario under the Proposed Action based on the alternative chosen. Non-Project traffic would largely avoid the work area and transiting construction vessels, with potentially fewer adjustments needed based on the vessels' routes and the reduced work area. Project O&M vessel traffic under Alternatives C through F would be less than that of the Proposed Action. When compared to all future activities considered in this analysis, these reductions in the Project's impact would cause a meaningful reduction in cumulative impacts. The reduction would to some extent depend on the actions taken by other future activities. Alternative D1, for example, would result in less of a reduction in impacts if the adjacent OCS-A 0517 lease area were to be developed to its full extent than it would if OCS-A 0517 development were limited to the southernmost WTGs under this alternative. Therefore, Alternatives C through F would result in a minor adverse cumulative impact to vessel traffic and, when combined with past, present, and reasonably foreseeable future activities, an overall short- to long-term **minor** adverse cumulative impact.			

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3.16.2.2 Alternative B: Impacts of the Proposed Action on Navigation and Vessel Traffic

3.16.2.2.1 Construction and Installation

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The nearest anchorage area is 6.7 nm from the Project (DNV GL Energy USA, Inc. 2020:Section 2.2.2.5), and the Project would have no impact on ordinary anchoring activity in the area. The Project may have some impact on anchoring near the cable route, provided that a vessel might need to anchor in an emergency. Cable laying would have a temporary **negligible** to **minor** adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area.

Port utilization: Because of the small number of vessels involved with Project construction, any ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades; therefore, the impact to port operations would be temporary **negligible** adverse. See Section 3.11 for a list of potential port facilities the Project could use and how they would be used. There would be a temporary **negligible** adverse impact on port congestion.

Presence of structures: Revolution Wind would implement temporary safety zones around the locations with active construction, develop a mariner communication plan, and limit construction activities to periods of good weather conditions (see Table F-1 in Appendix F). This would minimize impacts from offshore RWEC construction. The impact would be temporary and increase from **negligible** to **moderate** adverse as structures are added.

Vessel traffic: Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the RWF, offshore RWEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as allisions.

Construction of offshore components of the Project would require approximately 8 months for the RWEC, 5 months for WTG foundations, 5 months for the IAC, 8 months for WTGs, and 8 months for OSSs (see Chapter 2, Figure 2.1-17). The NSRA indicates the highest risk would be from smaller non-Project vessels operating close to construction and work vessels. Because of the small number of vessels used for construction and the location of the Project outside shipping lanes (see Figures 3.16-2 and 3.16-3), there would be a short-term (for the duration of construction activities) **minor** adverse impact on deep draft, tug, and towing vessels, which would need to reroute around the Project for a slightly longer route, and smaller passenger vessels, which could reroute closer to shore, increasing grounding potential. During construction and installation, commercial fishing vessels would need to avoid work areas and could be adversely impacted, depending on the location of the exploitable biomass and whether there are suitable alternative locations; with respect to navigation, commercial fishing vessels would experience temporary **moderate** adverse impacts. Because of the small number of vessels involved in construction, Project construction would have a temporary (for the duration of construction activities) **negligible** adverse impact on commercial traffic as a whole.

3.16.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The nearest anchorage area is 6.7 nm away from the Project (DNV GL Energy USA, Inc. 2020:Section 2.2.2.5), and the Project would have no impact to ordinary vessel anchorage operations, although risks would still exist for emergency anchoring and vessels transiting the area. Impacts of anchoring and new cable emplacement/maintenance on deep draft vessels during operations would be long term **negligible** adverse.

Port utilization: Any ports used by vessels conducting maintenance would have a long-term **negligible** adverse impact because ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades.

Presence of structures: For vessels that generally travel within and through the Lease Area, the NSRA mapped out the placement of the structures and evaluated the time of potential visual obstruction each would present based on a vessel's speed (DNV GL Energy USA, Inc. 2020:Section 9). At a speed of 5 knots, a vessel's view could be obstructed for as much as 7.8 seconds. The NSRA notes that this is a conservative estimate because it reflects the view of a single moving vessel and not multiple moving vessels that would enhance each vessel's ability to see the others. Because of the 1 × 1–nm spacing of the Project structures, the impact on visibility would be further reduced. The Project would use USCG-approved lighting to make nearby vessels aware of structure locations (see Appendix F for EPMs). The structures would not impact a mariner's ability to use navigation aids or the coastline as a reference for navigation. Overall, spacing and placement of the structures would result in a long-term **negligible** adverse impact to visibility. NOAA also would identify and chart the structures and offshore RWEC.

Under the Proposed Action, there is a modeled increase of 1.4 incidents per year in the NSRA's study area over baseline conditions as a result of changes to travel patterns to certain vessel types (DNV GL Energy USA, Inc. 2020:Table 11-2). More than 99% of total incidents would be allisions, and 92% of total incidents would involve fishing vessels. Based on the NSRA results, there would be a negligible increase (0.004) in collisions.

The Project calls for a standard and uniform grid pattern with 1-nm spacing between structures (WTGs and OSSs) across the contiguous RI/MA WEA lease areas, which provides sufficient space for certain vessels that fish in the RI/MA and MA WEAs to continue fishing after the wind farms are constructed. See Figure 1.1-2 for location of the RI/MA and MA WEAs. The USCG has determined that if structures are developed along a standard and uniform grid pattern, formal or informal vessel routing measures would not be required because such a grid pattern would provide space for dispersal of the fleet that can safely accommodate both transits through and fishing within the RI/MA and MA WEAs. The USCG believes the 1 × 1–nm aligned and gridded layout should be sufficient to maintain navigational safety and provide vessels with multiple straight-line options to transit safely throughout the contiguous RI/MA WEA lease areas (USCG 2020).

The USCG has reviewed all available studies on radar interference and found that although these studies show that structures could have some effect upon radar, as discussed in the MARIPARS report, they do not render radar inoperable and do not inform planning decisions about structure arrangement or spacing (USCG 2020).

Overall, there would be a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk.

Vessel traffic: During operations, maintenance is expected on a periodic basis for each offshore component (offshore transmission facilities, WTG and OSS foundations, and WTGs) (see COP Sections 3.5.2 through 3.5.4). This limited operation activity would have a long-term **negligible to minor** adverse impact on navigation and vessel traffic, with impacts primarily on commercial fishing and other vessels operating at the same time and place as maintenance vessels.

Because of the low frequency of allision and collision incidents and Project EPMs (see Table F-1 in Appendix F), the expected risks to navigation would be long term **negligible** adverse. Most deep draft vessel traffic already avoids the area and would not need to meaningfully reroute, as shown in Figures 3.16-2 and 3.16-3. The Project is outside existing traffic lanes and is not expected to require significant rerouting of traffic to avoid Project components (DNV GL Energy USA, Inc. 2020:Table 5-1).

Impacts to traffic from offshore RWEC maintenance would be temporary **negligible** adverse because of the infrequent nature of monitoring and inspection. Decommissioning of the Project would have similar short-term (for the duration of decommissioning activities) **minor** to **moderate** adverse impacts as construction because decommissioning would use similar numbers of vessels and implement the same EPMs. After the facility is decommissioned, the navigation conditions in the area would return to pre-Project conditions.

3.16.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: The Proposed Action would add up to 7,187 acres of seafloor disturbance from RWEC, OSS-link, IAC installation, and anchoring/mooring activity to the seafloor cable–related disturbance estimated under the No Action Alternative. This would result in localized temporary **minor** adverse cumulative impacts on navigation and vessel traffic due to increased collision and spill risk during construction. BOEM estimates a total of 19,383 acres of seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the GAA. During installation and maintenance, other vessels could also be forced to reroute to avoid installation and maintenance vessels. Cable installation for the Project is not expected to overlap with other project cable routes or installation based on the location of other offshore wind projects and proposed construction schedules (see Appendix E). Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have short-term **minor** to **moderate** adverse cumulative impacts on navigation and vessel traffic.

Port utilization: Port upgrades and vessel activity associated with the Proposed Action could result in negligible impacts to navigation and vessel traffic. The Proposed Action is expected to require as many as 61 construction vessels during construction in 2023 and 2024 (see COP Table 3.3.10-3), although most vessels would remain in the work area, with fewer vessels transporting crew and materials back and forth from ports. This additional vessel traffic could cause delays or changes in berthing patterns at primary ports. It could lead to operators being redirected to use alternate ports or facilities on a temporary basis. To some extent, individual ports could independently undertake facility improvement projects in

anticipation of this demand to relieve some of the potential congestion. The Project's impact on port capacity would also be limited due to the small number of additional vessels.

Project port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects. Port activities could be delayed or ports could experience congestion or changes in utilization as a result of the overlap in construction activities. Therefore, the cumulative impacts of the Proposed Action when combined with past, present, and reasonably foreseeable future projects would have long-lasting overall but temporary impacts on specific ports (depending on how each project manages its port utilization) with localized **minor** to **moderate** adverse impacts on port utilization.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and two OSSs to the 1,036 structures present under the No Action Alternative, which would increase navigational complexity and therefore the risk of collision, allision, and potential spills. Additional structures could also interfere with marine radars and aircraft engaging in search and rescue efforts. See Table 3.16-1 for a summary of miles traveled by vessels carrying AIS within the Lease Area and other lease areas in 2019. The commercial fisheries discussion in Appendix G presents VMS numbers for commercial fishing vessels. The Proposed Action would account for 10% of the total future structures in the GAA; however, Revolution Wind would implement a 1 × 1–nm uniform north–south and east–west grid spacing, consistent with other contiguous RI/MA WEA lease areas. Therefore, the Project would contribute a long-term **moderate** adverse impact from the presence of structures due to increased navigational complexity and allision risk. The cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominantly of impacts described under the No Action Alternative, which would represent a long-term **moderate** adverse impact on navigation and vessel traffic.

Vessel traffic: The Proposed Action would add as many as 61 construction vessels during construction in 2023 and 2024 to conditions under the No Action Alternative (see COP Table 3.3.10-3). The Proposed Action represents up to 43% of the total maximum vessels potentially present in 2023 but only up to 14% of the total maximum working vessels in 2024. Non-Project traffic would be able to adjust routes and avoid the work area and transiting construction vessels. Project O&M vessel traffic would be substantially less because the RWF would represent less than 6% of the WTGs in service by 2030 under the No Action Alternative, all of which are assumed to have similar O&M vessel traffic generation. Therefore, the Proposed Action would result in a **minor** adverse impact to vessel traffic. BOEM estimates a peak of 380 vessels at sea on a daily basis due to offshore wind Project construction and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be short term **minor** adverse.

3.16.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact navigation and vessel traffic, primarily through increased traffic; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes, or allisions, and groundings. BOEM anticipates the impacts resulting from the Proposed Action alone would be long term **moderate** adverse.

Therefore, BOEM expects the overall impact on navigation from the Proposed Action alone to be long term **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from temporary to long term **negligible** to **moderate** adverse. The main IPF of concern is the presence of structures, which increase navigational complexity and therefore the risk of collision/allision. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **moderate** adverse impacts to navigation. The overall effect to navigation and vessel traffic would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken.

3.16.2.3 Alternatives C, D, E, and F

3.16.2.3.1 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Presence of structures: The Habitat Alternative would reduce the number of WTGs in the central area of the Lease Area, which would alleviate some navigational complexity around that area, where WTGs are not present. However, the presence of an OSS in the center of the area that would otherwise be clear of WTGs (under both C1 and C2) would introduce some complexity, and the presence of three WTGs to the northeast of the OSS (under C2) would create further complexity. Overall, the net effect is that Alternative C (under both C1 and C2) would have a slightly reduced impact from the presence of structures from the Proposed Action: long term **minor** to **moderate** adverse.

For the Transit Alternative, Alternative D1 would result in a long-term **moderate** adverse impact from the increased navigational complexity and allision risk. Alternative D2 would result in a long-term **minor** to **moderate** adverse impact from the increased navigational complexity and allision risk, specifically reducing impacts on the fishing and passenger vessels that transit through this area, as it would remove an "ungrouped" section of structures, making navigation through this area more predictable. Alternative D3 would result in a long-term **minor** to **moderate** adverse impact from the presence of structures due to the increased navigational complexity and allision risk. Alternative D3 would result in a somewhat reduced impact from the Proposed Action (although not enough to change the impact rating), as it would remove structures adjacent to the inbound lane of the Buzzards Bay Traffic Separation Scheme that fall within the USCG's Marine Planning Guidelines buffers (USCG 2019). This would reduce risks specifically to commercial and international vessels (e.g., deep draft cargo and tanker). Alternatives D1+D2, D1+D3, and D1+D2+D3 would have a long-term **minor** to **moderate** adverse impact from the presence of structures.

For the Viewshed Alternative, Alternative E2 would expand the traffic separation scheme buffer from 1 nm to 2 nm, reducing the potential for conflict with vessel traffic. Overall, spacing and placement of the structures would result in a long-term **minor** to **moderate** adverse impact to visibility, although navigational complexity would increase from the concentration of traffic in the open area and increase the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision. Removal of structures under this alternative would primarily affect commercial fishing vessels, which are active in the area. Alternatives E1 and E2 would reduce impacts to

fishing vessels and would result in a long-term **minor** adverse impact to fishing vessel navigation from the presence of structures due to the increased allision risk.

For the Higher Capacity Turbine Alternative, the presence of structures impacts during operations and maintenance and decommissioning could be slightly reduced but similar to that for the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen and the location(s) of foundations affected by the reduction.

3.16.2.3.2 Cumulative Impacts

Offshore Activities and Facilities

Presence of structures: The Habitat Alternative would create an apparent passage through the middle of the Lease Area along a northeast–southwest route, which could encourage traffic to transit through that area. However, the presence of structures in the adjacent OCS-A 0517 lease area could create navigational issues. Therefore, Alternative C (under both C1 and C2) would have the same cumulative impact from presence of structures as the Proposed Action: long term **moderate** adverse.

For the Transit Alternative, under Alternative D1, the fishing industry–proposed transit lane intersects four contiguous BOEM lease areas: OCS-A 0486 (RWF), OCS-A 0487, OCS-A 0500, and OCS-A 0517. If a similar east–west opening were to be incorporated in the selected alternatives for proposed wind energy projects in the OCS-A 0487, OCS-A 0500, and OCS-A 0517 lease areas, it would reduce the number of structures but may also increase navigational complexity by concentrating traffic in the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision, resulting in a long-term moderate adverse impact on navigation. However, if any of those other lease areas are approved with wind energy project configurations that do not incorporate a similar opening, Alternative D1 would increase the navigational complexity and may result in a long-term **moderate** adverse impact on navigation.

Under Alternative D2, the fishing industry–proposed transit lane intersects four contiguous BOEM lease areas: OCS-A 0486, OCS-A 0487, OCS-A 0500, and OCS-A 0501. Under this alternative, the easternmost reach of the RWF Lease Area would be open for vessel traffic. If the selected alternatives for proposed wind energy projects in the OCS-A 0487, OCS-A 0500, and OCS-A 0501 lease areas to the south of this section were to adopt a similar transit alternative to allow north–south traffic, it would reduce the number of structures but may also increase navigational complexity by concentrating traffic in the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly, increased risk of allision/collision, resulting in a cumulative long-term to moderate adverse impact on navigation. If the other projects were to develop structures that preclude north–south transit, the cumulative impact on navigation would be long term **moderate** adverse.

Under Alternative D3, the setback proposed would intersect only the OCS-A 0486 Lease Area (RWF). Under this alternative, the lack of structures along the northwestern edge of the Lease Area would extend the traffic separation scheme buffer from 1 nm to 2 nm. No other RI/MA WEA lease areas would be affected by this change, resulting in a long-term **moderate** adverse cumulative impact to navigation.

Combining alternatives would result in combined effects. It would reduce the number of structures but may also increase navigational complexity by concentrating traffic in the open area and increasing the likelihood that fishing activities will occur there. This could lead to conflicting uses and, accordingly,

increased risk of allision/collision, Alternatives D1+D2, D1+D3, and D1+D2+D3 would result in long-term **moderate** adverse cumulative impacts.

For the Viewshed Alternative, structures removed by this alternative relative to the Proposed Action are positioned away from other lease areas and would not cause additional interactions with structures in those other areas. As a result, the cumulative impact of each of the Alternative E layouts would be long term **minor** adverse to navigation.

Under the Higher Capacity Turbine Alternative, presence of structures impacts from cumulative activities could be slightly reduced but similar to that for the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen and the location(s) of foundations affected by the reduction.

3.16.2.3.3 Conclusions

Although these alternatives would reduce the number of WTGs when compared to the maximum-case scenario under the Proposed Action and, in turn, the associated IACs and vessel activity, Alternatives C through F would maintain uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action: long term **moderate** adverse.

In the context of other future actions, BOEM expects the alternative's impacts would depend on development in nearby lease areas. Alternative C would add sources of navigation impacts (e.g., structures, noise, port utilization) to the No Action Alternative at quantities and durations similar to the Proposed Action. Therefore, the overall impact on navigation and vessel traffic when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: long term intermittent **moderate** adverse.

Alternative D could reduce impacts to **minor** to **moderate** adverse if other lease areas likewise limit development to create an east–west area that is open to traffic. However, if the other lease areas were to develop fully, the impacts of each Alternative D scenario when combined with other future activities would be the same level as the Proposed Action: long term **moderate** adverse.

For Alternative E, the locations where structures would be eliminated would not interact with development in other lease areas. Therefore, BOEM expects Alternative E's impacts would be long term **minor** to **moderate** adverse.

For Alternative F, the locations where structures would be eliminated cannot be determined. Depending on those locations, the Project could or could not interact with development in other lease areas. Therefore, BOEM expects Alternative F's impacts would be similar to that of the Proposed Action (long term **moderate** adverse) depending on the alternative (C, D, or E) chosen.

3.16.2.4 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies as a condition of state and federal permitting, or through agency-to-agency negotiations, are described in detail in Appendix F, Table F-2 and addressed here in more detail (Table 3.16-5).

Table 3.16-5. Proposed Mitigation Measures – Navigation and Vessel Traffic

Mitigation Measure	Description	Effect
Safety zone during cable installation	BOEM and BSEE would ensure that Revolution Wind coordinates with the U.S. Coast Guard in advance of export cable installation to develop a navigation safety plan, which may include establishing a safety zone around the cable laying vessel(s), a monitoring plan, a mitigation plan, a schedule, private aids to navigation, and local notice to mariners.	This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein.
Submarine cable system burial plan	A copy of the submarine cable system burial plan shall be submitted by Revolution Wind as part of its facility design report and fabrication and installation report that depicts precise planned locations and burial depths of the entire cable system.	This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein.
Boulder relocation reporting	The locations of any boulder (which would protrude > 2 meters or more on the seafloor) relocated during cable installation activities must be reported to BOEM, USCG, NOAA, and the local harbormaster.	This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein.
Vessel safety practices	All Project vessels involved in construction, O&M, and decommissioning activities would comply with U.S. or international Safety of Life at Sea standards, as applicable, with regards to vessel construction, vessel safety equipment, and crewing practices.	This measure would not modify the impact determinations for navigation and vessel traffic but would ensure that these effects do not exceed the levels analyzed herein.

3.17 Other Uses

3.17.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Other Uses

Geographic analysis area: The GAA for other uses: scientific research and surveys includes the footprint of the Proposed Action and all reasonably foreseeable projects between Maine and mid-North Carolina (Figure 3.17-1). This area encompasses locations where scientific research and surveys are anticipated.

The reader is referred to Appendix E2 Assessment of Resources with Minor (or Less) Impact Determinations for a discussion of GAAs for additional other uses categories analyzed in the EIS (aviation and air traffic, land-based radar, military and national security, and undersea cables).

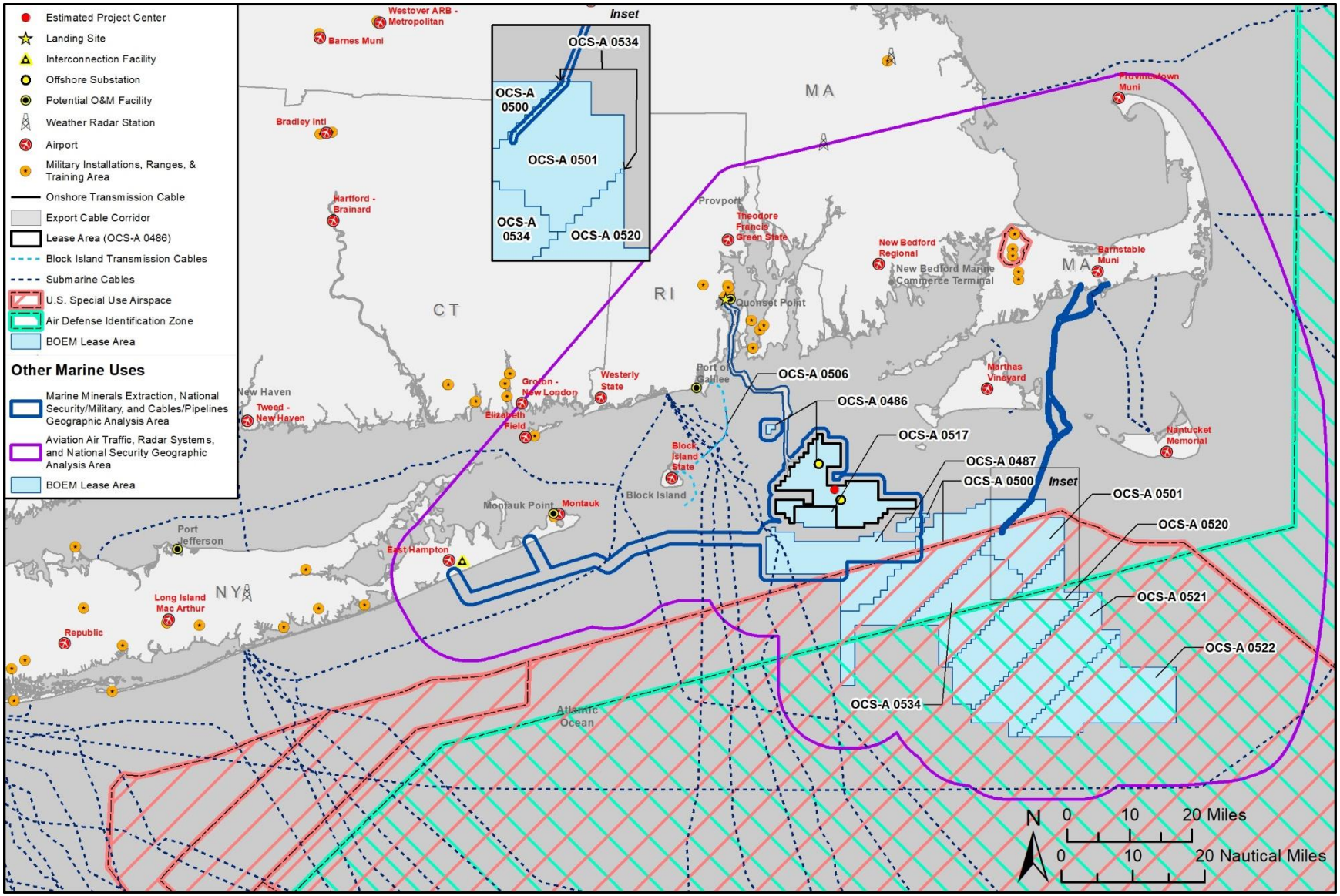

Figure 3.17-1. Geographic analysis areas for other uses.

3.17.1.1 Aviation and Air Traffic

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

3.17.1.2 Land-Based Radar

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

3.17.1.3 Military and National Security

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

3.17.1.4 Scientific Research and Surveys

Affected environment: Government-managed fisheries surveys, both state and federal, occur within the region at varying times of year. As an example, through the Ecosystems Surveys Branch, NOAA Fisheries collects fishery-independent data using standardized research vessel surveys from Cape Hatteras, North Carolina, to the Scotian shelf. These data are used for assessment, management, and a variety of research programs (NOAA Fisheries 2018). NOAA Fisheries' seasonal survey locations vary and are randomly selected, stratified by depth. BOEM and NOAA are currently developing a draft federal survey mitigation strategy for the northeast U.S. region that is currently undergoing public review and that addresses potential impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022). Because of the depths and acreage in the region, there is a likelihood of sample survey locations being placed within the RWF and waters along the RWEC. It is likely that other surveys conducted by academic institutions and non-governmental organizations occur within the region (vhb 2022).

Regular fisheries management and ecosystem monitoring surveys conducted by or in coordination with the NEFSC would overlap offshore wind lease areas in the New England region and south into the mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units; 5) NOAA's Atlantic Marine Assessment Program for Protected Species aerial and shipboard survey; and 6) North Atlantic Right Whale Sighting Advisory System aerial survey (BOEM 2021). As future wind development continues, alternative platforms, sampling designs, and sampling methodologies could be needed to maintain surveys conducted in or near the Project.

3.17.1.4.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential scientific research and survey impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non-offshore wind activities is provided in Appendix E1.

Anchoring and new cable emplacement/maintenance: Up to 12,196 acres could be affected by anchoring/mooring activities and cable installation during offshore wind energy development within the GAA. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact scientific research and surveys by increasing the number of vessels within the GAA. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of scientific research vessels, thereby increasing navigational complexity and risk of collisions. These impacts are expected to be the highest during construction phases and lower during infrequent yearly routine maintenance and monitoring of offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on scientific research and surveys would be **negligible** adverse**.**

Light: Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of scientific research vessel collisions. This would result in a general increase of lights in the GAA, which could impact the natural environment and alter research conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse.

Presence of structures: This EIS incorporates, by reference, the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS (BOEM 2021). Activities associated with offshore wind development such as site assessment activities, construction of reasonably foreseeable offshore wind farms (including placement of structures such as OSSs and WTGs), associated cable systems, and vessel activity would present additional navigational obstructions for sea and air-based scientific surveys. If construction of all projected future offshore wind facilities occurs along the Atlantic coast, these developments would add up to as many as 3,008 structures between by 2030. Collectively, these developments would prevent NMFS from continuing ongoing scientific research surveys or protected species surveys under current vessel capacities and could reduce future opportunities for NMFS' scientific research in the area.

NMFS scientific surveys that overlap with wind development areas collectively represent over 277 survey-years of total effort by dedicated NOAA ship and aircraft resources. Data gathered from these surveys represent some of the most comprehensive data on marine ecosystems in the world, and data within offshore wind development areas are essential to those datasets in the Northwest Atlantic Ocean. These data support fisheries assessments and management actions, protected species assessments and management actions, ecosystem-based fisheries management, and regional and national climate assessments, as well as a number of regional, national, and international science activities.

Within offshore wind facility areas, survey operations would be curtailed or eliminated under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined activities within offshore wind facilities are not within their safety and operational limits. The need for survey vessels to navigate around large offshore wind projects to access survey stations would cause a loss of efficiency for surveys conducted outside the wind energy areas by reducing sampling time available with limited sea day allocations for survey vessels. In addition, changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols. Stock assessment surveys for fisheries and protected species and ecological monitoring surveys considered in this analysis include, but are not limited to the NMFS spring and fall multi-species bottom trawl surveys; the NMFS surf clam survey; the NMFS ocean quahog survey; the NMFS integrated benthic survey/Atlantic scallop survey (optical and dredge); NMFS winter, spring, summer and fall ecosystem monitoring surveys; the NMFS North Atlantic right whale photographic sightings surveys (aerial); the NMFS marine mammal, sea turtle, and seabird vessel surveys; the NMFS marine mammal and sea turtle aerial surveys; the Virginia Institute of Marine Science scallop dredge survey; and the Northeast Area Monitoring and Assessment Program surveys.

In summary, offshore wind facilities could adversely affect scientific surveys by preclusion of NOAA survey vessels and aircraft from sampling in survey strata and impacts on the random-stratified statistical design that is the basis for assessments, advice, and analyses. Scientific survey and protected species survey operations would therefore be reduced or eliminated as offshore wind facilities are constructed (BOEM 2021). Offshore wind facilities would disrupt survey sampling statistical designs, such as random stratified sampling. Impacts to the statistical design of region-wide surveys violate the assumptions of probabilistic sampling methods. Development of new survey technologies, changes in survey methodologies, and required calibrations could help to mitigate losses in accuracy and precision of current practices due to the impacts of wind development on survey strata.

Other offshore wind projects could also require implementation of mitigation and monitoring measures through BOEM approvals or consultations. Identification and analysis of specific measures are speculative at this time; however, these measures could further impact NMFS's ongoing scientific research surveys or protected species surveys because of the increased vessel activity and/or in-water structures from these other projects.

BOEM and NOAA are currently developing a draft federal survey mitigation strategy for Vineyard Wind that is currently undergoing public review and that addresses potential impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022).

Overall, the No Action Alternative would have **major** adverse effects on NMFS' scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities, as well as potential **major** adverse impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species. Therefore, the effects of the presence of structures on scientific research and surveys under the No Action Alternative would be **major** adverse.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to future offshore wind facilities located outside of the Lease Area could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak in 2025 with as many as 276

vessels involved in construction of reasonably foreseeable OSW projects. While construction periods of various wind energy facilities may be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the effects of vessel traffic on scientific and research surveys under the No Action Alternative would be **minor** adverse.

3.17.1.4.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. However, ongoing and future activities would have **major** adverse impacts on scientific research and surveys due to the presence of structures that reduce future opportunities for NMFS' scientific research in the area.

BOEM anticipates **moderate** adverse impacts on scientific research and surveys due to the impacts of ongoing offshore wind activities (BIWF). BOEM anticipates that the impacts to reasonably foreseeable offshore wind activities would be **major** adverse, primarily because of the potential impacts of structures to NMFS survey efforts. The No Action Alternative would forgo the fisheries and benthic habitat monitoring that Revolution Wind has committed to voluntarily perform. Therefore, the results of this monitoring would not be available to provide an understanding of the effects of offshore wind development; benefit future management of finfish, invertebrates, and EFH; or inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore would result in **major** adverse impacts for scientific research and surveys and USCG SAR activities (of people or marine mammals). The presence of stationary structures could prevent or hamper continued NMFS scientific research surveys using current vessel capacities and monitoring protocols or reduce opportunities for other NMFS scientific research surveys in the area. Coordinators of large vessel survey operations or operations deploying mobile survey gear have determined that activities within offshore wind facilities would not be within current safety and operational limits. In addition, changes in required flight altitudes due to the proposed WTG height would affect aerial survey design and protocols. BOEM acknowledges that NOAA's Office of Marine and Aviation Operations endorses the restriction of large vessel operations to greater than 1 nm from wind installations due to safety and operational challenges.

3.17.1.5 Undersea Cables

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

3.17.2 Environmental Consequences

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

The analysis presented in this section considers the impacts resulting from the maximum design scenario under the PDE approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis.

The following design parameters would result in different impacts relative to those generated by the design elements considered under the PDE:

- The selection of lower capacity WTG designs would reduce the total WTG height from 873 to as low as 648 feet, reducing impacts to low-flying aircraft.
- The selection of a higher capacity WTG design would reduce the total number of fixed structures that survey vessels could be required to avoid.

See Appendix E1 for a summary of IPFs analyzed for other uses across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Tables E2-15 to E2-21. Other uses subsections that are determined by BOEM to have a minor or less adverse effect from the action alternatives (aviation and air traffic, military uses, land-based radar, and undersea cables) are provided in Appendix E2.

Table 3.17-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on other uses. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action follows Table 3.17-1. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes rationale for the effects determinations. The overall effect determination for each alternative is **major** adverse for scientific research and surveys.

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Table 3.17-1. Alternative Comparison Summary for Other Uses

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Scientific Research and Surveys						
Anchoring and new cable emplacement/ maintenance	**Offshore: O**ffshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact scientific research and surveys by increasing the number of vessels, increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited because cable emplacement vessels would be restricted to emplacement corridors and their activities would be of short duration. Therefore, the effects of anchoring and new cable emplacement and maintenance on scientific research and surveys would be **negligible** adverse.	**Offshore:** Vessel anchoring, cable installation, seafloor preparation, and placement of cable protection activities would occur during Project construction and O&M that could impact scientific research and survey uses. Impacts are expected to be limited because as cable emplacement vessels would be restricted to emplacement corridors and their activities would be of short duration. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse. Reasonably foreseeable future actions in combination with the Proposed Action could result in up to 19,526 acres that could be affected by anchoring and mooring and cable installation activities during offshore wind energy development within the GAA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on scientific research and survey.	**Offshore:** all offshore impacts under Alternatives C through F would result in a noticeably smaller offshore impact compared to the maximum case under the Proposed Action. The effects of this IPF would therefore be the same or slightly reduced relative to those described for the Proposed Action: **negligible** adverse for construction and O&M and **minor** adverse for cumulative.			
Light	**Offshore:** Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. The increase in light in the area could change conditions or species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse.	**Offshore:** Construction and installation and O&M of the Proposed Action would result in an increase in lighting on WTGs offshore, which could have minor adverse effects on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse.	**Offshore:** While Alternatives C through F could result in a reduction in construction and operational lighting, the effects of this IPF on scientific research and surveys would otherwise be similar to those described for the Proposed Action. Therefore, the impact on scientific research and surveys under this alternative would be **minor** adverse.			
Presence of structures	**Offshore:** Offshore wind facilities could adversely affect scientific surveys by preclusion of NOAA survey vessels and aircraft from sampling in survey strata and impacts on the random-stratified statistical design that is the basis for assessments, advice, and analyses. Scientific survey and protected species survey operations would therefore be reduced or eliminated as offshore wind facilities are constructed (BOEM 2021). Overall, the No Action Alternative would have **major** adverse effects on NMFS' scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities, as well as potential **major** adverse impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species.	**Offshore:** NMFS scientific research and protected species surveys could be curtailed within the Lease Area due to Project activities, and NMFS believes that construction of the RWF and the survey adjustments needed would constitute a long-term **major** adverse impact on those surveys.	**Offshore:** While the offshore footprint would be reduced under all configurations, the effects of this IPF on scientific research and surveys under Alternatives C through F would otherwise be similar to those described for the Proposed Action. Therefore, the impact of this IPF on scientific research and surveys would be **major** adverse**.**			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Vessel traffic	**Offshore:** Increased vessel traffic due to future offshore wind facilities could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Therefore, the effects of vessel traffic on scientific and research surveys under the No Action Alternative would be **minor** adverse.	**Offshore:** Increased vessel traffic due to construction and installation and O&M of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, offshore construction activities of Project facilities could be a hazard to scientific research vessels as they could experience hazards from passing Project construction vessels. With EPMs, however, the Proposed Action would be **minor** adverse for vessel traffic. Vessel activity could peak with as many as 380 vessels involved in construction of reasonably foreseeable projects. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse.	**Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. While the offshore footprint would be reduced under all configurations, vessel traffic is expected to remain at similar levels as vessel traffic under the Proposed Project. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on scientific research and surveys would be **minor** adverse under all Project phases.			

3.17.2.2 Alternative B: Impacts of the Proposed Action on Aviation and Air Traffic

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

3.17.2.3 Alternative B: Impacts of the Proposed Action on Land-Based Radar

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

3.17.2.4 Alternative B: Impacts of the Proposed Action on Military and National Security (including Search and Rescue)

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

3.17.2.5 Alternative B: Impacts of the Proposed Action on Scientific Research and Surveys

3.17.2.5.1 Construction and Installation

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Vessel anchoring, cable installation, seafloor preparation, and placement of cable protection activities would occur during Project construction. This would involve increased construction vessel traffic that could impact scientific research and survey uses by increasing the number of vessels within the GAA. Additionally, cable emplacement could impact bottom-trawl NMFS surveys that are planned in wind areas, although it is likelier that the development of the RWF would preclude scientific research and studies from occurring in the GAA, which would result in a greater impact discussed under Presence of Structures. Impacts specific to anchoring and cable emplacement during Project construction would be restricted to cable emplacement corridors, which would result in limited contact with cable emplacement installation vessels. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse.

Light: Construction and installation of the Proposed Action would result in an increase in temporary construction lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. This would result in a general increase of lights in the GAA, which could have minor adverse effects on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action would be **minor** adverse.

Presence of structures and vessel traffic: Scientific research and protected species surveys could be affected from the construction of the RWF and RWEC. Some vessels or low-flying aircraft could be required to alter course to avoid WTGs. NOAA policy advises survey vessels to remain at least 1 mile from fixed structures if possible (Hooker 2019). NOAA has concluded that, within offshore wind facility areas, survey operations would be curtailed, if not eliminated, under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined that activities within offshore wind facilities are not within their safety and operational limits. Vessels could be required to make minor course adjustments to avoid collisions but would not be completely blocked from using the areas around the WTGs. Nevertheless, NMFS scientific research and protected species surveys could be curtailed within the Lease Area, and NMFS believes that construction of the RWF and the survey adjustments needed would constitute a long-term **major** adverse impact on those surveys.

Increased vessel traffic due to construction and installation of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, offshore construction activities of Project facilities could be a hazard to scientific research vessels as they could experience hazards from passing Project construction vessels. Two primary means of reducing this risk are updates to mariners from the Project and safety zones around construction activity. Revolution Wind has committed to informing fishermen and other mariners about offshore activities related to the RWF. Fisheries liaisons and a team of fisheries representatives are based in regional ports, and updates would be provided to mariners online and via twice-daily updates on very high frequency channels. Safety zones can also protect mariners from potential hazards during construction activities. It is anticipated that the Coast Guard would implement safety zones during construction of the Project, as they did for the construction of the BIWF (USCG 2016). To reduce the likelihood of allision or collision during construction, Project safety vessel(s) would be on scene to advise mariners of construction activity (DNV GL Energy USA, Inc. 2020).

Because NMFS surveys could be curtailed in the Lease Area and because of increased collision risk, the effects of presence of structures and vessel traffic on scientific and research surveys under the Proposed Action would be **major** adverse for presence of structures and **minor** adverse for vessel traffic**.**

3.17.2.5.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Vessel anchoring and cable maintenance would occur during Project O&M and decommissioning. This would involve a slight increase in construction vessel traffic that could impact scientific research and survey uses by increasing the number of vessels within the GAA. Impacts specific to anchoring and cable emplacement during Project O&M and decommissioning are expected to be restricted to cable emplacement corridors, which would result in limited contact with cable emplacement and maintenance vessels. Cables associated with the RWF would be removed as part of decommissioning. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on scientific research and studies would be **negligible** adverse.

Light: O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on up to 100 WTGs offshore. All existing stationary structures would have navigation marking

and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. Implementation of navigational lighting and marking per USCG and BOEM requirements and guidelines would further reduce the risk of scientific vessel collisions. This would result in a general increase of lights in the GAA, which could have a negative impact on scientific research and surveys by impacting the natural environment and changing conditions compared to other areas used for scientific research and surveys that do not have artificial light. The increase in light in the area could change species' behavior, which could impact the results of scientific research and surveys. Light impacts are expected to be **minor** adverse compared with other impacts discussed below in Presence of structures and vessel traffic. Lighting would be removed as part of WTG and OSS decommissioning. Therefore, impacts from structural lighting alone on scientific research and surveys under the No Action Alternative would be **minor** adverse.

Presence of structures and vessel traffic: Scientific research and protected species surveys could be affected from the O&M and decommissioning of the RWF and RWEC. Some vessels or low-flying aircraft could be required to alter course to avoid WTGs. NOAA policy advises survey vessels to remain at least 1 mile from fixed structures if possible (Hooker 2019). NOAA has concluded that, within offshore wind facility areas, survey operations would be curtailed, if not eliminated, under current vessel capacities and monitoring protocols. Specifically, coordinators of large vessel survey operations or operations deploying mobile survey gear have currently determined that activities within offshore wind facilities are not within their safety and operational limits. Vessels could be required to make minor course adjustments to avoid collisions but would not be completely blocked from using the areas around the WTGs. Nevertheless, NMFS scientific research and protected species surveys could be curtailed within the Lease Area, and NMFS believes that construction of the RWF and the survey adjustments needed would constitute a long-term **major** adverse impact on those surveys.

Increased vessel traffic due to O&M and decommissioning of the Proposed Action could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. However, less vessel traffic is anticipated during O&M and decommissioning than during construction and installation activities. Additionally, during operations, each WTG foundation would serve as an aid to navigation (ATON) for mariners as they are large structures that would be lighted and marked as required by applicable law and regulation, and as included in any/all conditions the Coast Guard may impose in conjunction with its private aids to navigation (PATON) permits. The Project structures and seaward components would be clearly marked on applicable NOAA nautical charts, including Chart No. 13218 (NOAA 2020). Revolution Wind would work closely with the USCG and NOAA to chart all elements of the Project (DNV GL Energy USA, Inc. 2020; Orsted 2020).

Therefore, the effects of presence of structures and vessel traffic on scientific and research surveys under the Proposed Action for O&M and decommissioning would be **major** adverse for presence of structures and **minor** adverse for vessel traffic.

3.17.2.5.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Up to 19,526 acres could be affected by anchoring/mooring activities and cable installation during construction and installation of offshore elements of the RWF, combined with other reasonably foreseeable future actions. Construction of

offshore elements of the RWF would involve cable emplacement, which would involve increased vessel traffic. This could create conflicts with scientific and research vessels by increasing the number of vessels within the GAA and the number of cables constructed. However, the cable emplacement vessels would be restricted to cable emplacement corridors, which would result in limited contact with scientific and research vessels. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on scientific research and surveys.

Light: The Proposed Action would result in an increase in temporary lighting and permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. Implementation of navigational lighting and marking per USCG and BOEM requirements and guidelines would further reduce the risk of scientific vessel collisions. This would result in a general increase of lights in the GAA, which could have an impact on scientific and research surveys by increasing navigational complexity. Reasonably foreseeable activities combined with the Proposed Action would also increase lighting in the area and would include up to 1,138 additional lighted structures in the GAA. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse.

Presence of structures: This EIS incorporates, by reference, the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS (BOEM 2021). BOEM and NOAA are currently developing a draft federal survey mitigation strategy for Vineyard Wind that is currently undergoing public review and that addresses potential impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022). The Proposed Action would result in long-term **major** adverse impacts to scientific research and surveys through the installation of up to 100 WTGs and two OSSs to conditions under the No Action Alternative. These structures would result in adverse impacts to NMFS' scientific research and protected species surveys due to 1) WTG blade tip height that would exceed the survey altitude for current surveying methodologies, and 2) Lease Area geographic overlap with ongoing NMFS' Northeast Fisheries Science Center fishery resource monitoring surveys. Research and monitoring proposed by the lessees and/or conducted by other scientific institutions would continue in offshore wind facilities.

The Proposed Action structures represents a 3% increase over total estimated 3,008 WTG and OSS foundations under the No Action Alternative that could be present along the Atlantic coast if all projected future offshore wind facilities are constructed. Within the GAA, BOEM estimates a cumulative total of 1,138 offshore WTG and OSS foundations for the Proposed Action plus all other future offshore wind projects. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would represent a long-term **major** adverse impact on NMFS's scientific research and protected species surveys and the resulting stock assessments.

Vessel traffic: The Proposed Action would result in increased vessel traffic due to construction and installation, O&M, and decommissioning of the Proposed Action that could lead to course changes of scientific and research vessels and increased traffic along vessel transit routes. Additionally, increased vessel traffic due to reasonably foreseeable future actions could lead to course changes of scientific and research vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak with as many as 380 vessels involved in construction of reasonably foreseeable

projects. While construction periods of various wind energy facilities could be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse.

3.17.2.5.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing scientific research studies occurring in the GAA. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **major** adverse. Therefore, BOEM expects that the overall impact on scientific research and surveys from the Proposed Action alone to be **major** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **major** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **major** adverse for scientific research and surveys.

3.17.2.6 Alternative B: Impacts of the Proposed Action on Undersea Cables

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

3.17.2.7 Alternatives C, D, E, and F: Aviation and Air Traffic

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

3.17.2.8 Alternatives C, D, E, and F: Land-Based Radar

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

3.17.2.9 Alternatives C, D, E, and F: Military and National Security (including Search and Rescue)

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

3.17.2.10 Alternatives C, D, E, and F: Scientific Research and Surveys

Table 3.17-1 provides a summary of IPF findings by alternative.

3.17.2.10.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel traffic, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **major** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **major** adverse for scientific research and protected species surveys.

3.17.2.11 Alternatives C, D, E, and F: Undersea Cables

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

3.17.2.12 Mitigation

Mitigation measures for other uses (scientific research and surveys) proposed by BOEM and other cooperating agencies are listed in Appendix F, Table F-2 and addressed in more detail in Table 3.17-2.

Table 3.17-2. Proposed Mitigation Measures – Other Uses (scientific research and surveys)

Mitigation Measure	Description	Effect
Adherence to federal survey mitigation guidance	BOEM is committed to working with NOAA Fisheries toward a long-term regional solution to account for changes in survey methodologies because of offshore wind farms. NOAA Fisheries and BOEM recently published (March 22, 2022) a draft federal survey mitigation implementation strategy for the Northeast U.S. region to address anticipated impacts of offshore wind energy development on NOAA Fisheries' scientific surveys (Hare et al. 2022). Activities described in the implementation strategy are designed to mitigate the effect of offshore wind energy development on NOAA Fisheries surveys and is referred to as the Federal Survey Mitigation Program. The mitigation program will include survey-specific mitigation plans for each affected survey, including both vessel and aerial surveys. The implementation strategy is intended to guide the implementation of the mitigation program through the duration of wind energy development in the Northeast U.S. region, and Revolution Wind will adhere to the measures suggested to the extent practicable.	This measure would complement existing EPMs and reduce anticipated negligible impacts to scientific research and survey efforts.

3.18 Recreation and Tourism

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

3.19 Sea Turtles

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

3.20 Visual Resources

3.20.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Visual Resources

Geographic analysis area: The GAA for non-historic visual resources encompasses a 40-mile radius extending from the boundary of the Lease Area and a 3-mile radius encompassing the OnSS and visually sensitive resources within New York, Connecticut, Rhode Island, and Massachusetts (Figure 3.20-1). The GAA comprise approximately 6,113 square miles of open ocean, and 1,488 square miles of land and shoreline. Approximately 28 towns or communities in Rhode Island, 33 in Massachusetts, six in Connecticut, and two in New York are within the GAA (EDR 2021a). This section addresses information and impacts related to non-historic visual resources. Information and impacts related to historic visual resources can be found in Section 3.10.

Visual resource impacts associated with the RWF were evaluated and determined based on information and findings associated with the RWF visual impact assessment (VIA) (EDR 2021a) and the application of recently implemented BOEM impact assessment methodology, *Methodology for Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* (seascape, landscape, and visual impact assessment [SLVIA]) (Sullivan 2021). At the request of BOEM, the lessee applied the SLVIA methodology for determination of impacts to the viewer's visual experience and impacts to ocean, seascape, and landscape character (Sullivan 2021:29–33) to the extent possible to previously documented evaluation information and impact methodologies associated with the VIA which pre-dates the SLVIA.

The SLVIA impact methodology was compared with the VIA to extract previously documented existing view information and landscape similarity zone characteristics (EDR 2021a) and translated into Ocean Character Areas (OCAs), Seascape Character Areas (SCAs), and Landscape Character Areas (LCAs) at a generalized scale following the SLVIA as well as visual conditions and information. A total of 37 viewing condition scenarios (e.g., daytime, sunset, and nighttime) associated with 28 individual key observation points (KOPs), were assessed in the VIA and include photo simulations (EDR 2021a:91–145), along with additional OCA, SCA, and LCA visibility computations, and compiled based on SLVIA and VIA guidance in Tables G-40a through G-48 in Appendix G. For each action alternative, data was compiled and organized based on the best-known information provided in the VIA and compared to the Proposed Action. Additionally, visibility analysis for each action alternative was analyzed associated with OCAs, SCAs, LCAs (character areas) and Specially Designated Areas (SDAs) as well as the proximity of KOPs in relation to action alternative variations (closest WTG and closest removed WTG based on the alternative) to provide geographic context of the overall distance in relation to the KOP. Identifying the closest WTG and closest removed WTG in relation to each KOP provides a tabular understanding of how action alternatives relate to each KOP (see Appendix G). Not all KOPs were evaluated for all action alternatives. The orientation of specific KOPs in relation to action alternatives were reviewed and selected for further analysis based on the geographic proximity of each action alternative.

Affected environment: Three distinct visual settings occur within the GAA and are categorized into OCAs, SCAs, and LCAs based on their inherent physical and built characteristics. These character areas aid in understanding the types of sensitive viewers and locations along with uses that occur within the GAA. The OCA is considered the open ocean area from the state and federal waters boundary (3 nm from shore) to the extent of the analysis area, approximately 6,113 square miles. The OCA consists of the Atlantic Ocean and

interconnected bodies of water such as Rhode Island Sound, Block Island Sound, Narragansett Bay, Fisher's Island Sound, Buzzards Bay, Mount Hope Bay, Vineyard Sound, Nantucket Sound, and other bays and coves. Depending on weather conditions, the texture of the ocean surface can range from smooth to choppy, and its color can range from blue, to silver, to dark gray. The ocean within the GAA can be categorized as a working water landscape that supports a variety of uses and associated human-made features, including recreational and commercial fishing, commercial shipping, ferry transportation, pleasure boating, and associated maritime activities and features (buoys, channel markers, warning lights, etc.) (EDR 2021a).Within the GAA, SCAs and LCAs have been combined to include the land area inland from the ocean edge based on best available data sources and general descriptive characteristics using landscape similarity zone information from the VIA. SLVIA tables for each action alternative in Appendix G have landscape similarity zones from the VIA categorized as SCAs and LCAs based on descriptive characteristics and with SLVIA metrics applied as appropriate. The total land area associated with the SCA and LCA as described in the following narrative accounts for roughly 1,488 square miles within the GAA and is used for comparison purposes related to the visibility of alternatives (see Appendix G).

Areas that can be considered SCAs consist of Long Island; Block Island; Conanicut Island; Cuttyhunk Island; Prudence Island; Aquidneck Island; the Elizabeth Islands; Martha's Vineyard; Nantucket; and several smaller islands scattered along the coast of Connecticut, Massachusetts, and Rhode Island. Topography is typically undulating to gently rolling, with dunes and/or steep bluffs occurring along shorelines. Elevations range from sea level to a maximum of approximately 600 feet amsl near West Greenwich, Rhode Island. Cuttyhunk Island, Block Island, and Long Island have high points ranging from 130 to 200 feet amsl. Vegetation is typically characterized by a mix of scrub forest, grassy dunes, salt marshes, freshwater wetlands, and open fields (agricultural and successional). LCAs within the GAA consist of Connecticut, Rhode Island, and Massachusetts (mainland New York does not occur within the GAA) and are categorized by low hills, and valleys are primarily forested with scattered freshwater lakes, ponds, and occasional agricultural land. Residential and urbanized development occurs throughout the LCAs and consists of seasonal and year-round homes, villages, roads, and ports, with the highest density found in villages and towns. Outside of the village and town center areas, inland development is more scattered at a lower density and is in a largely forested landscape (EDR 2021a).

The VIA (EDR 2021a) located in COP Appendix U3 further categorizes the above visual settings into landscape similarity zones, which are based on the similarity of landscape character and visual features such as landform, vegetation, and water and land use patterns such as recreation, residential and commercial development, and transportation. Descriptions of each of the 17 landscape similarity zones identified within the GAA can be found in the VIA (EDR 2021a:15–25).

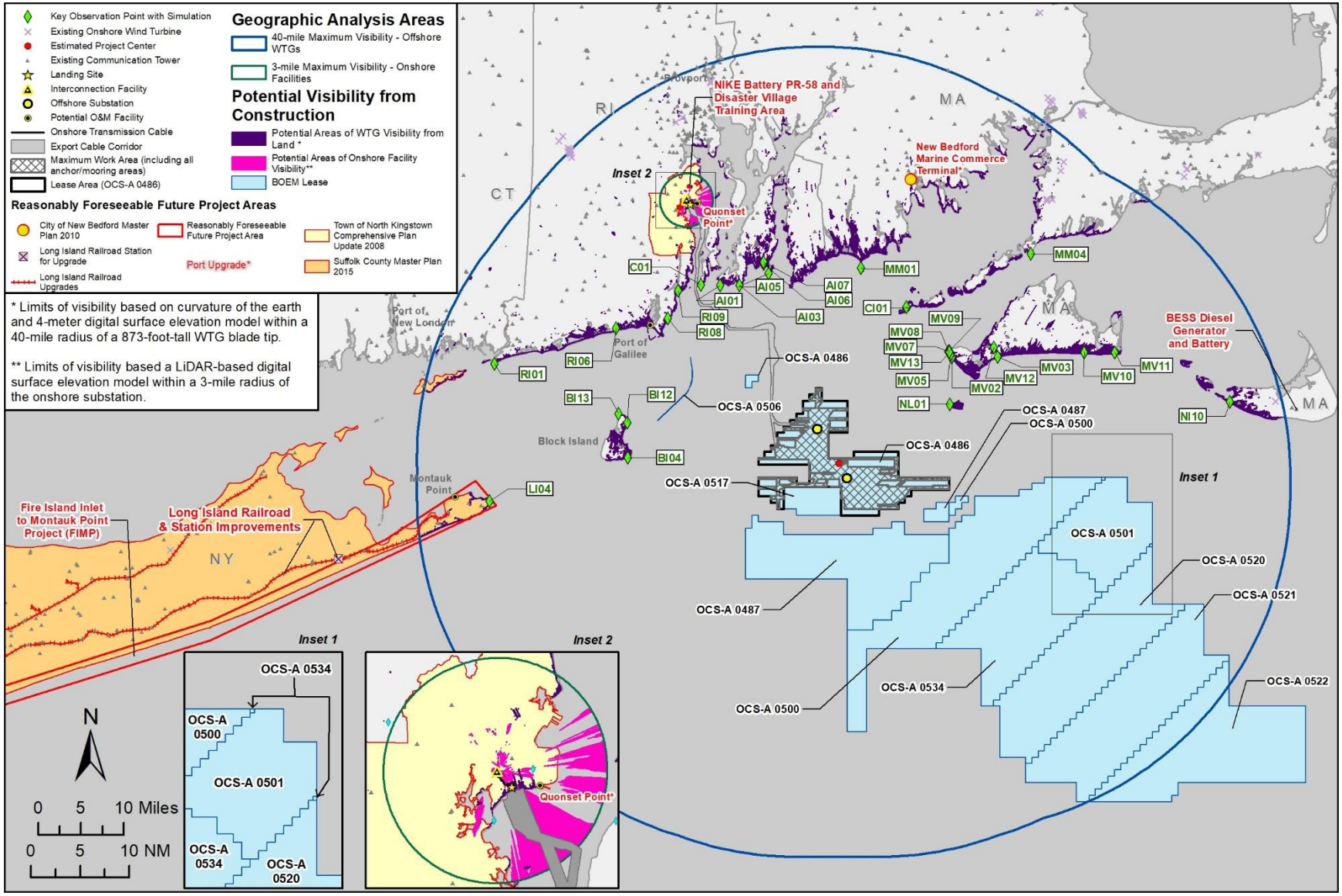

Figure 3.20-1. Geographic analysis areas for visual resources.

Viewers within the GAA have been categorized into five general user groups (local residents, through-travelers, tourists and vacationers, recreational users, and the fishing community [recreational and commercial]) based on their relative viewer experience within the GAA and their perceived sensitivity to visual changes in the landscape. Local residents consists of those who live, work, and travel for their daily business within the GAA. They generally view the landscape from their yards, homes, local roads, and places of employment. Residents' sensitivity to visual quality is variable, and how they experience their surroundings on a day-to-day basis is based on the location and or locations they visually interact with either in residential, workplace, or recreational settings. Through-travelers are typically vehicle based and moving, thus having a relatively narrow field of view oriented along the axis of the roadway, and are most often destination-oriented, viewing the landscape either from the driver or passenger perspective. Through-travelers who are not residents of the area or vacationers are unlikely to be particularly sensitive to visual change and often engage with visual experiences at that time and place rather than over a consistent period of time where visual change can be more noticeable. Tourists and vacationers consist of out-of-town visitors and seasonal/weekend residents who come to the area to experience its scenic and recreational resources. Tourists and vacationers in the area are generally involved in outdoor recreational activities in settings where the experience can be directly connected to the activity or location, such as parks, trails, and beaches, and in natural settings such as forests, dunes, and the ocean.

Recreational users are generally considered to have relatively high sensitivity to aesthetic quality and changes in landscape character. Information regarding the types of recreation for both onshore and offshore users is described in Section 3.18. The fishing community is represented by recreational and commercial fishermen who work in and experience the coastal and open ocean environment on a regular basis. Despite the focused activity associated with harvesting seafood, the fishing community is particularly sensitive to changes to the visual seascape since there is often nothing in the immediate environment except for open ocean and horizon. The fishing community can have prolonged visual exposure to the open ocean, seascape, and coastal environment, in which fleets spend hours to days setting gear and harvesting fish. Those who use the ocean recreationally (e.g., boating, whale watching, sightseeing, etc.) and commercially (fishing, commercial transportation) are distinct user groups that would have foreground and middle ground views of the Project, whereas the other user groups are largely land-based and restricted to background and extended background views (EDR 2021a).

3.20.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential visual resources impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non-offshore wind activities is provided in Appendix E1.

3.20.1.1.1 Offshore Activities and Facilities

Light: Development of offshore wind lease areas would increase the amount of offshore light sources associated with construction and installation, O&M, and decommissioning during the life of future projects. Lighting associated with night construction and decommissioning for future projects within BOEM lease areas would be localized and temporary and staggered over time; therefore, the lease areas would not have light sources across the entirety of the GAA at one time. However, light sources, depending on quantity, intensity, and location, could be visible from unobstructed sensitive onshore and offshore viewing locations based on viewer distance.

Field observations associated with visibility of FAA warning lighting (warning lighting) for the BIWF were conducted in May 2019 (HDR 2019). The BIWF consists of five WTGs with a blade tip height of approximately 600 feet. Observations of FAA nighttime lighting visibility under clear sky conditions in open water identified that warning lighting may be visible to the naked eye at a distance of 23.3 nm (26.8 miles) from the viewer (HDR 2019). The approximate 27-mile distance where the BIWF hub height drops below the visible horizon due to the curvature of the Earth and WTG height and viewer position influences the overall distance from which warning lighting may be visible. The BIWF report also concludes that daytime visibility of WTGs from land and water viewing locations is strongly dependent on weather conditions and distance (HDR 2019). Research related to the visibility of onshore WTGs in western landscapes (Sullivan et al. 2012) analyzed the visibility of FAA lighting at various distances and concluded that warning lighting was visible approximately 31.3 nm (36 miles) from viewing positions in broad, uninterrupted onshore landscapes, which would be a similar viewing condition as views across the open ocean setting. Of note, warning lighting may be visible beyond 36 miles, and the aforementioned study (Sullivan et al. 2012) had intervening topography that influenced visibility at the 36-mile distance. Therefore, it is assumed based on the referenced studies that the visibility of warning lighting may be visible anywhere from 23.3 nm (26.8 miles) to 31.3 nm (36 miles) or beyond.

Warning lighting systems would be used for the duration of Project O&M following BOEM guidelines (BOEM 2021a) for each reasonably foreseeable offshore wind project (936 WTGs). The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the midsection of each tower and one at the top of each WTG nacelle within the lease areas would have long-term **minor** to **major** adverse impacts to onshore and offshore KOPs based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors such as haze and fog would influence visibility and perceivability of warning lighting from viewing locations. Additionally, long-term impacts associated with OCAs, SCAs, and LCAs would range from long term **minor** to **major** adverse based on the relationship of the character areas, lease areas inherent nighttime visual characteristics, and projects' inconsistences with those nighttime characteristics. Based on warning light viewshed analyses conducted as part of the VIA (EDR 2021a:64), for analysis purposes, the following thresholds are considered as part of nighttime visual impacts: minor to negligible impacts are anticipated for distances beyond approximately 26 nm (30 miles); moderate impacts are anticipated for distances between approximately 17 nm (20 miles) and 26 nm (30 miles); and major impacts are anticipated for distances from viewer position out to 17 nm (20 miles). As noted above, overall visibility based on viewer position, atmospheric conditions, and other environmental and intervening factors.

Implementation of an ADLS is an EPM (see Table F-1in Appendix F) and a component of the Proposed Action. The shorter duration synchronized flashing of the ADLS (activated as needed by nearby aircraft) would have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning light system. Based on a recent study by Capital Airspace related to ADLS efficacy associated with the RWF, historic air traffic data for flights passing through the warning light activation area indicated that the ADLS would have been activated for a total of 3 hours 35 minutes and 39 seconds over a 1-year period. Considering the local sunrise and sunset times, an ADLS warning light system could result in over a 99% reduction in warning light duration as compared to a traditional continuous warning light system (see COP Appendix S4 for ADLS efficacy analysis).

Lighting impacts would be most pronounced (although for a short duration with the implementation of an ADLS) for locations that can be currently characterized as undeveloped within the seascape both from an

onshore and offshore perspective, where lighting from infrastructure and activities is not dominant or perceivable by the casual observer (viewer). Therefore, visual resource impacts would be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts for a short duration of time to viewers based on the observed distances as categorized under the warning lighting impacts above and the anticipated activation time over the period of 1 year. Impacts to character areas would also be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts for a short duration of time based on the relationship of the character areas, the lease areas' inherent nighttime visual characteristics, and projects' inconsistences with those nighttime characteristics. After decommissioning, the adverse impacts associated with O&M would cease.

Presence of structures: Planned future wind facility projects would consist of an estimated 953 WTGs and OSSs (see Table E4-1 in Appendix E4). In general, under clear daytime atmospheric conditions and depending on natural lighting angles, projects built within BOEM lease areas that are within 10.4 nm (12 miles) of character areas and viewing areas would have major adverse visual impacts, viewing areas beyond 10.4 nm (12 miles) up to 20.8 nm (24 miles) would have moderate to major adverse impacts, and viewing areas beyond 20.8 nm (24 miles) up to 26 nm (30 miles) would have minor adverse impacts (BOEM 2021b). Viewing areas that exceed 26 nm (30 miles) from projects would have negligible adverse visual impacts due to distance, the curvature of the Earth, and the influence of atmospheric conditions, which would decrease the ability of the viewer to discern or perceive projects at that distance. The combined visual effects of the planned project structures to KOPs, character areas and SDAs, when viewed from both onshore and offshore locations, would create long-term **negligible** to **major** adverse visual impacts. The overall impacts to KOPs, character areas and SDAs would be dependent on geographic distance, curvature of the Earth, and orientation to the project; the elevation of the viewer; the degree of visibility considering lighting and atmospheric conditions; and the perceivable contrast, dominance and scale of WTGs and OSSs along the horizontal plane of the ocean.

3.20.1.1.2 Onshore Activities and Facilities

Light: Future onshore planning projects within the GAA may require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and may introduce additional or new infrastructure elements into SCAs and/or LCAs, although specific locations and project designs have not been determined. Infrastructure and associated nighttime lighting to support other offshore wind projects (e.g., OnSS O&M facilities) are anticipated to occur in areas of existing development or where similar infrastructure and development exist to aid in co-location of similar resources. Therefore, additional nighttime lighting sources associated with infrastructure to support other offshore wind projects would be a noticeable change over time and would have long-term **negligible** to **moderate** adverse impacts depending on the final location of infrastructure and additional lighting needs in relation to existing nighttime light sources.

Presence of Structures: Future onshore planning projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into the characteristic landscape over a period of time, although specific locations and design have not been determined. Infrastructure to support other offshore wind projects (e.g., OnSS O&M facilities) are anticipated to occur in or be co-located in areas of existing development associated with SCAs or LCAs where similar infrastructure and development exists based on trends in siting of these facilities associated with recent offshore wind projects. Therefore, the addition of structures to support other offshore wind projects would be noticeable over time and would have long-term **negligible** to **moderate** adverse

impacts to identified KOPs, character areas and SDAs depending on the final location of structures in relation to other built features in the characteristic landscape.

Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on the viewer's visual experience and character areas associated with the Project would not occur. However, ongoing and future offshore wind activities would have continued temporary to long-term adverse impacts, primarily through construction and O&M of WTGs and associated lighting.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **negligible** to **major** adverse for KOPs, character areas and SDAs. BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind (as described in Appendix E) are anticipated to be **negligible** to **moderate** adverse as those ongoing activities and reasonably foreseeable activities would have less prominence and dominance as compared to offshore wind projects.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts because the overall effect would be substantial, but the resource would be expected to recover completely after decommissioning.

3.20.2 Environmental Consequences

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

The Project design envelope provides for a range of WTGs sized from 8 to 12 MW. The analysis of impacts to visual resources is based on the PPAs being met using 648-foot 8-MW WTGs. This would result in a total of up to 100 WTGs and up to two OSSs for a total of 102 structures in the Lease Area.

If Revolution Wind instead installs sixty-four 12-MW WTGs, the maximum height of the blade tip for WTGs would be 873 feet above the surface compared to 648 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, BOEM guidance, consistent with FAA requirements, would require additional mid-tower lighting in addition to lighting at the top of the nacelle (BOEM 2019). BOEM guidance further recommends that lighting color be of a red infrared wavelength between 675 and 900 nanometers based on LED light sources and that red flashing lights flash simultaneously at 30 flashes per minute (BOEM 2019). Although the 12-MW WTG option would reduce the number of WTGs, the 226-foot taller WTGs and additional lighting would be similar in contrast in the seascape character and potentially would result in greater visual impacts within the GAA associated with the viewers' visual experience, as the WTGs may be visible at greater distances in comparison with the 8-MW WTGs.

See Appendix E1 for a summary of IPFs associated with visual resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-11 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an

offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.20-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Analysis findings that identify an action alternative (C, D, E, or F) that has the greatest potential for the reduced visual impacts (least impactful) as a result of the removal of turbines in relation to KOPs or character areas have been carried forward in Table 3.20-1 rather than describe impacts for all action alternatives. Further details and information related to all action alternatives are comprehensively compiled in Appendix G. The Conclusion section within each alternative discussion includes rationale for the effects determinations.

Under all of the action alternative configurations (options), overall impacts to non-historic visual resources from any alternative would range from long term **negligible** to **major** adverse for KOPs, SDAs, and character areas related to the overall visual change and magnitude of change based on analysis findings that indicate the largest number of overall impact determinations. Individual KOPs where sensitivity may influence impacts such as tribal concerns or recreation associated with scenic beaches may indicate higher impacts and are individually identified in Appendix G. Impacts would be substantial, but the resource would recover completely when the impacting agents are removed.

Table 3.20-1.Alternative Comparison Summary for Visual Resources

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Light	**Offshore**: Development of offshore wind lease areas would increase the amount of offshore light sources associated with construction and installation, O&M, and decommissioning during the life of future projects. Lighting associated with night construction and decommissioning for future projects would be localized and temporary. However, light sources, depending on quantity, intensity, and location, could be visible from unobstructed onshore and offshore KOPs based on viewer distance. The existing offshore wind lease areas, following established grid spacing guidelines within the RI/MA and MA WEAs, have space for up to an estimated 936 WTGs. BOEM lighting guidelines require a minimum of three red flashing lights at the midsection of each tower and one at the top of each WTG nacelle. The potential full build-out of the existing offshore wind lease areas could result in up to 936 WTGs with lighting and would have long-term **minor** to **major** adverse impacts to onshore and offshore KOP distance and angle of view, assuming no obstructions. Under the No Action Alternative, visual resource impacts would be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts to KOPs, character areas and SDAs based on the observed warning light distances discussed in Section 3.20.2.1. Impacts to nighttime seascape character would also be short term during construction and long term during O&M, with **negligible** to **major** adverse impacts based on the relationship of the lease areas inherent nighttime visual characteristics and projects' inconsistences with those nighttime characteristics. After decommissioning, the adverse impacts associated with O&M would cease.	**Offshore**: The Proposed Action would require nighttime lighting for construction vessels traveling and working within the Lease Area, as well as the addition of warning lighting systems at each WTG and OSS during an 8-month construction period. This lighting could be visible and impact the viewer's nighttime visual experience and inherent nighttime seascape character. Nighttime visibility of warning lighting may be perceived anywhere from approximately 23.3 nm (26.8 miles) to 31.3 nm (36 miles) from the viewer or farther. During construction, visual impacts to the viewer's nighttime visual experience and inherent nighttime character would be temporary when associated with vessel traffic and construction lighting. These impacts would be **negligible** to **major** adverse based on viewer distance and existing night sky environment. Aquinnah Overlook (MV07), the closest occupied KOP to the Proposed Action, is located approximately 11.10 nm (13.7 miles) distant. The farthest KOP from the Proposed Action, Madeaket Beach (NI10), is located approximately 30.0 nm (34.6 miles) distant. These two KOPs are the representative minimum and maximum KOP distances in relation to perceivability of warning lighting. KOP distances in relation to the nearest WTG are described in Appendix G. During O&M, the Proposed Action would contribute to nighttime lighting due to required warning lighting on up to 100 WTGs and two OSSs. Revolution Wind has committed to implementing ADLS as an EPM to reduce the duration of lighting impacts associated with the Project. Because of the limited duration and frequency of anticipated warning lighting activations with ADLS and the visibility of warning lighting, the Proposed Action would result in short duration, long-term intermittent **negligible** impacts when lights are off to **major** adverse impacts to KOPs and character areas when lights are activated. Not all KOPs or character areas would experience the same level of impact due to variances in atmospheric conditions and natural and physical barriers to the view. Impacts during decommissioning would be similar to the impacts during construction and installation, long term, short duration ,and intermittent **negligible** to **major** adverse. Lighting from the Proposed Action would add up to 102 in-water structures to the lighting impacts from past, present, and reasonably foreseeable future projects (assumed to be up to 953 structures) for a combined total of up to 1,055 lighted structures within the GAA, a 10.7% increase in lighting compared to the No Action Alternative (Table E4-1). Nighttime vessel and construction area lighting during construction of the Proposed Action would be limited in duration and cease when construction is complete. Atmospheric and environmental conditions would influence visibility and perceivability from KOPs, character areas and SDAs. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** adverse impacts when lights are off to **major** adverse impacts to nighttime viewers and the existing night sky environment when lights are activated.	**Offshore**: No measurable change from Proposed Action construction impacts is anticipated because the number and duration of construction vessels and work areas requiring nighttime lighting, as well as the assembly of WTGs and associated OSS warning lighting, would result in temporary long-term **negligible** to **major** adverse impacts based on viewer distance and existing night sky condition, similar to the Proposed Action. Alternatives C through F would reduce nighttime O&M lighting by 7% to 43%, respectively, as compared to the maximum case scenario for the Proposed Action, due to required warning lighting of fewer WTGs, plus the two OSSs. Alternative D1+D2+D3 would have the greatest reduction of lighting-related impacts as a result of the known location of the reduction of WTGs within the northeastern and northwestern portions of the Lease Area, which are in closest proximity to more KOPs. Impacts associated with Alternative D1+D2+D3 would be **negligible** to **minor** adverse based on viewer distance (see Section 3.20.1.1) and the existing night sky environment, and as such is the least impactful alternative relative to visual resources collectively. See Appendix G for further details of the action alternatives analysis. Offshore construction activities would add new WTGs and two OSSs to the No Action Alternative. Construction vessels would employ navigational safety lighting and offshore structures would employ aviation and navigation hazard lighting. Lighting from Alternatives C through F would contribute to an approximately 6% to 10% increase in lighting sources from past, present, and reasonably foreseeable future projects within the GAA. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, Alternatives C through F would result in long-term **negligible** adverse impacts when lights are off to **major** adverse impacts when lights are activated on nighttime viewers and the existing night sky environment, with Alternative E1 having the greatest contribution to reducing cumulative lighting impacts.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	Onshore: Future onshore components of offshore projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into SCAs and/or LCAs. However, specific locations and project designs have not been determined. Infrastructure and associated nighttime lighting to support other offshore wind projects (e.g., OnSS or O&M facilities) are anticipated to occur in areas of existing development or where similar infrastructure and development exist to aid in co-location of similar resources. Therefore, additional onshore nighttime lighting sources associated with infrastructure to support future offshore wind projects would be a noticeable change over time and would have long-term **negligible** to **moderate** adverse impacts for the life of the projects.	**Onshore**: Light and noise from onshore construction activities could temporarily adversely impact viewers if located near the landing site, onshore cable route, or proposed onshore facilities. It is assumed that construction activities would occur during daylight hours. Fifteen publicly accessible KOPs were identified in the Visual Resource Assessment and Historic Resources Visual Effects Analysis within 3 miles of the OnSS and ICF with the closest at approximately .6 miles (Narraganset Bay) (EDR 2021b). Impacts to these KOPs are not anticipated due to distance, intervening vegetation, and existing lighting sources. Approximately 500 feet south and west of the OnSS and ICF are residential properties consisting of single-family and multifamily residences. Dense stands of tall trees (40 feet tall on average) provide a natural buffer between the OnSS and ICF and the residences, which is anticipated to reduce any nighttime-related impacts to nearby residences to **negligible** adverse. Onshore lighting related to construction activity for the O&M facility, located within an existing industrial use area with existing lighting, would create short-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment due to the nature of the construction lighting, which would be contained to the existing property and be similar in nature to surrounding facilities and light sources. The nighttime lighting impacts of the OnSS, ICF, and O&M facility would cause long-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment during Project O&M. Impacts associated with the OnSS and ICF would be reduced by the use of switched vs. motion operational lighting, which would comply with local lighting regulations. Impacts associated with the O&M facility would be associated with localized light sources and operational uses, similar to surrounding infrastructure. Onshore construction and installation would add an O&M facility, OnSS, and ICF to the No Action Alternative. These onshore structures and nighttime lighting sources are anticipated to occur in areas of existing development or where similar infrastructure and development exists. Therefore, when considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in long-term **negligible** adverse impacts to nighttime viewers and the existing night sky environment.	**Onshore:** Alternatives C through F would not alter impacts from onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary **negligible** to **minor** adverse to potential nighttime viewers and the existing night sky environment based on viewer location and perspective in relation to existing onshore light sources.			
Presence of structures	**Offshore**: Based on the Proposed Action and action alternatives analysis findings (Section 3.20.2.2 and Appendix G), if future offshore wind projects are implemented, the effects of installed WTGs and associated infrastructure on KOPs, character areas and SDAs, when viewed from both onshore and offshore locations, would result in long-term **negligible** to **major** adverse visual impacts. The impacts experienced at KOPs, character areas and SDAs would be dependent upon distance and orientation to the project, the degree of visibility considering lighting and	**Offshore**: The addition of Project structures with navigation and aviation lighting over the 8-month construction period, coupled with the temporary increase and concentration in construction related vessel activity would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs. Sixteen of the 37 KOPs would experience major adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse with approximately 30,208 acres of visibility or 15.4 % of the approximately 195,701 acres of SDAs. Impacts to the OCA as a result of the construction activities noted above would be **major** adverse (approximately 5,882 square miles or 96.2 % of the total OCA within the GAA would have views of the Proposed Action. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall approximately 35 square miles (2.4 %) of the combined SCAs and LCAs would have visibility of the Project within the GAA. Of	**Offshore**: The layout and construction activities proposed under Alternatives C through F would include the same activities and construction sequencing as the Proposed Action and would result in similar anticipated impacts. Therefore, the construction and installation of offshore Project structures would have long-term **negligible** to **major** adverse impacts to KOPs, character areas and SDAs under Alternatives C through F, similar to those of the Proposed Action Alternatives C1 and C2: Due to the placement of WTGs, Alternative C2 would result in slightly lesser degree of impacts than Alternative C1. Alternative C2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with 10 of the 17 selected KOPs having major adverse impacts, four KOPs having moderate adverse impacts, and three KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,967 acres of visibility of Alternative C2 (15.3%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with Alternative C2 visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	atmospheric conditions, and the perceivable contrast, dominance, and scale of WTGs and OSSs along the horizontal plane of the ocean.	the 60 impact determinations associated with KOPs, character areas and SDAs associated with the Proposed Action, 21 major, 21 moderate, 11 minor and 7 negligible impacts were determined. Further information related to impacts associated with the Proposed Action is located in Appendix G. Further information related to impacts associated with the Proposed Action is located in Appendix G (Tables G-40a thru G-41e). WTGs would be more visually apparent viewed from the northern and easterly shorelines of Rhode Island and Massachusetts. The up to 100 WTGs and two OSSs would become less perceivable as the distance from KOPs and/or character areas increases. Atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action would also influence visibility and perceivability from KOPs (e.g., NI10 - modified haze/sun, MV12 day vs night, MV05 day vs night), which may not be depicted in all visual simulations, or from other non-simulated locations that may have visibility within character areas. It is anticipated therefore that Project O&M would result in long-term **negligible** to **major** adverse impacts. The Proposed Action would add up to 100 WTGs and two OSSs to the No Action Alternative. As a result, approximately 90% of the total potential WTGs and OSSs in the GAA (up to 1,055) would be associated with other future offshore wind development projects beyond the Proposed Action and at distances from KOPs, character areas and SDAs where atmospheric conditions and curvature of the Earth influence visibility. When combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** to **major** adverse cumulative impacts to KOPs, character areas and SDAs. Adverse impacts would be removed at Project decommissioning.	**moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative C2 would be visible to approximately 34.7 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Due to the similarity in placement of WTGs, Alternatives C1 and C2 would result in similar impacts, and both alternatives would result in fewer impacts than the Proposed Action. Of the 40 impact determinations associated with KOPs, character areas and SDAs, 14 major, 13 moderate, eight minor, and five negligible adverse impacts were determined for Alternative C2 (see Tables G-42 and G-43c). Alternative D alternatives: Of the seven Alternative D alternatives, Alternative D1+D2+D3 would result in the least number of adverse impacts because of the combination of removed turbines within the Lease Area as compared to the maximum case scenario for the Proposed Action. Alternative D1+D2+D3 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with 11 of the 37 selected KOPs having major adverse impacts, 15 KOPs having moderate adverse impacts, and 11 KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 28,840 acres of visibility of Alternative D1+D2+D3 (14.7%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with the Project visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse, similar to the Proposed Action based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 31.1 square miles (2.1%) of the combined SCAs and LCAs would have visibility of Alternative D1+D2+D3 within the GAA. Of the 60 impact determinations associated with KOPs, character areas and SDAs, 15 major, 24 moderate, 12 minor, and nine negligible adverse impacts were determined for Alternative D1+D2+D3 (see Tables G-44a and G-45c). Alternatives E1 and E2: Due to the placement of WTGs, Alternative E1 would result in slightly lesser degree of impacts than Alternative E2. Alternative E1 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with four of the 21 selected KOPs having major adverse impacts, 12 KOPs having moderate adverse impacts, and five KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,085 acres of visibility of Alternative E1 (14.9%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with the alternative visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, Alternative E1 would be visible to approximately 32.7 square miles (2.2%) of the combined SCAs and LCAs within the GAA. Of the 44 impact determinations associated with KOPs, character areas and SDAs, eight major, 21 moderate, seven minor, and eight negligible adverse impacts were determined for Alternative E1 (see Tables G-46 and G-47c). Alternative E2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with one of the 16 selected KOPs having major adverse impacts, six KOPs having moderate adverse impacts, and nine KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse with approximately 29,385 acres of visibility of Alternative E2 (15.0 %) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with the alternative visible to approximately 96% of the OCA. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, Alternative E2 would be visible to approximately 33.5 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Of the 39 impact determinations associated with KOPs, character areas and SDAs, five major, 15 moderate, seven

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
			minor, and 12 negligible adverse impacts were determined for Alternative E2 (see Tables G-46 and G-47c). Alternative F: Alternative F, when combined with other action alternatives, could reduce the number of WTGs installed in the Lease Area by 7% to 44% as compared to the maximum potential 100 WTGs installed under the Proposed Action. The potential reduction of impacts would depend on viewer distance and would be focused primarily on locations in closest proximity to the area of reduced WTGs. A reduction in WTGs installed would be expected to result in long-term **negligible** to **major** adverse impacts to KOPs, character areas and SDAs. However, the application of Alternative F cannot be fully evaluated until the specific WTGs to be removed are identified. Further information related to impacts associated with Alternatives C, D, and E are included in Appendix G. Alternatives C through F would add between 66 and 83 structures (WTGs and OSSs) to the estimated up to 953 structures under the No Action Alternative within the GAA. Of the four action alternatives identified as resulting in the greatest reduction of impacts, Alternative D1+D2+D3 would result in the smallest area of visibility (approximately 31 square miles of SCA and LCA). Alternative D1+D2+D3 when combined with other past, present, and reasonably foreseeable projects would result in long-term **negligible** to **major** adverse impacts to KOPs, character areas and SDAs in comparison to the No Action Alternative.			
	Onshore: Future onshore components of offshore wind projects could require OnSSs, ICFs, O&M facilities, and port upgrades depending on project needs and could introduce additional or new infrastructure elements into the characteristic landscape over a period of time, although specific locations and design have not been determined. Infrastructure to support other offshore wind projects (e.g., OnSS or O&M facilities) are anticipated to occur in or be co-located in areas of existing development associated with SCAs or LCAs where similar infrastructure and development exist. Therefore, the addition of onshore structures to support other offshore wind projects would be noticeable over time and would have long-term **negligible** to **minor** adverse impacts to identified KOPs, character areas and SDAs based on their location in relation to other infrastructure and facilities until the projects are decommissioned.	**Onshore**: The construction and installation of the OnSS and ICF would occur during an approximate 18-month construction period. During this period, there would be an noticeable change over time in the immediate foreground of the OnSS and ICF because of the addition of the facilities. The O&M facility at the Port of Davisville at Quonset Point would be similar to existing industrial infrastructure, consisting of large geometric features. Therefore, the addition of Project structures associated with the OnSS, ICF, and O&M facility would create long-term **negligible** adverse impacts to KOPs, character areas and SDAs until the projects are decommissioned. Where visible within immediate foreground distances, the OnSS and ICF would introduce new industrial-utility structures. However, the OnSS and ICF would be located adjacent to the existing Davisville Substation and would not be out of scale or character with the existing development in the vicinity, which ranges from transit rail and four-lane roadway to residential to heavy industrial within .5 mile. For this reason, the OnSS and ICF would result in long-term **negligible** adverse impacts to KOPs, character areas and SDAs. Onshore construction and installation would add an, ICF, and OnSS to the No Action Alternative. The O&M facility would utilize existing structures. The Proposed Action does not include any updates to ports. Any potential future port upgrades required to service the offshore wind industry would potentially result in similar **negligible** adverse visual impacts to KOPs, character areas and SDAs. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse cumulative impacts to KOPs, character areas and SDAs.	**Onshore**: There are no design differences between Alternatives C through F in onshore activities; therefore, impacts resulting from onshore activities would be the same as those described for the Proposed Action: long-term **negligible** to **minor** adverse to viewers based on viewer location and perspective in relation to existing onshore structures and development as well as associated LCAs.			

3.20.2.2 Alternative B: Impacts of the Proposed Action Alternative on Visual Resources

3.20.2.2.1 Construction and Installation

Offshore Activities and Facilities

Light: The Proposed Action would require nighttime lighting for construction vessels traveling and working within the Lease Area as well as the addition of warning lighting systems at each WTG and OSS during an 8-month construction period. This lighting could be visible and impact the viewer's nighttime visual experience and inherent nighttime seascape character. During construction, visual impacts to potential nighttime viewers and the existing night sky environment would be temporary when associated with vessel traffic and construction lighting. Impacts would be long term, of short duration, and intermittent when associated with WTGs and OSSs warning lighting implementing ADLS. These impacts would be **negligible** to **major** adverse based on the observed viewer distance, as described in Section 3.20.1.1. Aquinnah Overlook (MV07), the closest occupied KOP to the Proposed Action, is located approximately 11.10 nm (13.7 miles) from the Proposed Action and the farthest KOP, Madeaket Beach (NI10), is located approximately 30.0 nm (34.6 miles) from the Proposed Action; these KOPs are representative of the minimum and maximum KOP distances in relation to perceivability of warning lighting. KOP distances in relation to the nearest WTG are further described in Appendix G.

Presence of structures: Up to 102 Project structures (WTGs and OSSs) are proposed for installation within the GAA. As noted under the No Action Alternative, these offshore structures would impact both viewers and character areas throughout construction until build-out completion. During construction, offshore and onshore viewers would see the upper portions of tall equipment such as mobile cranes and vessels. This equipment would move from each WTG and OSS location as construction progresses and thus would be temporary fixtures. Subsequently, the construction and installation of Project structures would occur during an approximate 8-month construction period, when there would be an appreciable change over time in seascape character and the viewer's visual experience resulting from the addition of up to two OSSs and 100 WTG structures. This appreciable change during the 8-month construction period as a result of the addition of Project structures to full build-out based on the WTG installation sequence; the temporary increase and concentration in vessel activity associated with construction, installation, and transport activities; and the addition of navigational marking and lighting would create short-term to long-term **negligible** to **major** adverse impacts to KOPs, with 16 of the 37 KOPs having major impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 30,208 acres of visibility of the Proposed Action, or 15.4%, of the approximately 195,701 acres of SDAs. Impacts to the OCA as a result of the construction activities noted above would be **major** adverse (approximately 5,882 square miles, or 96.2%, of the total OCA within the GAA would have views of the Proposed Action). Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, the Project would be visible to approximately 35 square miles (2.4%) of the combined SCAs and LCAs within the GAA. Of the 60 impact determinations associated with KOPs, character areas and SDAs, 21 major, 21 moderate, 11 minor, and seven negligible adverse impacts were determined for the Proposed Action. Further information related to impacts associated with the Proposed Action is located in Appendix G (see Tables G-40a thru G-41e).

Onshore Activities and Facilities

Light: Light from onshore construction activities could temporarily adversely impact viewers if located near the landing site, onshore cable route, and proposed onshore facilities. It is assumed that construction activities would occur during daylight hours. Fifteen publicly accessible KOPs were identified in the Visual Resource Assessment and Historic Resources Visual Effects Analysis within 3 miles of the OnSS and ICF, with the closest at approximately 0.6 mile distant (Narraganset Bay) (EDR 2021b). Based on aerial imagery, approximately 500 feet south and west of the OnSS and ICF, there are residential properties consisting of single-family and multifamily residences. However, dense stands of tall trees, approximately 40-feet tall or greater, provide a natural buffer (approximately 300–350 feet thick) between the OnSS and ICF and the residences, which is anticipated to reduce any potential nighttime-related impacts to nearby residences to **negligible** adverse.

Nighttime lighting associated with the O&M facility at the Port of Davisville at Quonset Point would be localized (consisting of temporary nighttime safety and security lighting) because construction activities would occur during daylight hours. Based on viewer location and perspective in relation to existing onshore light sources, onshore lighting related to construction activity for the O&M facility would create short-term **negligible** adverse impacts to potential nighttime viewers and the existing night sky environment. Impacts associated with O&M facility would be associated with localized light sources associated with the facility and operational uses, similar to surrounding infrastructure.

Presence of structures: A new OnSS and ICF would be constructed to support interconnection of the Project to the existing electrical grid. Vegetation clearing associated with the access road and taller equipment (e.g., crane tip) may be visible from Camp Avenue or from surrounding residences during construction of these onshore structures. The construction and installation of the OnSS and ICF would occur during an approximate 18-month construction period. During this period, there would be a noticeable change over time in the immediate foreground of the OnSS and ICF because of the addition of the facilities. However, viewers would generally be screened and have obstructed views of construction activities because of the presence of existing development combined with densely forested areas that surround the facilities (EDR 2021b).

The O&M facility at the Port of Davisville at Quonset Point would consist of two structures to house office space (approximately 1,000 square feet) and storage space (approximately 11,000 square feet) and located on the existing Air National Guard base. The structures, which are to be refurbished existing facilities, would be similar to existing industrial infrastructure, consisting of large geometric features. Therefore, the noticeable change during the 18-month construction period as a result of construction and installation activities and the addition of Project structures associated with the OnSS, ICF, and O&M facility would create long-term **negligible** adverse impacts to KOPs, character areas and SDAs based on viewer location and perspective in relation to existing onshore structures and development.

3.20.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Light: During O&M, the Proposed Action would contribute to nighttime lighting due to required warning lighting of up to 100 WTGs and two OSSs. During times when the warning lighting is activated, this lighting would add a developed-industrial visual element to views that were previously characterized by

dark, open ocean. The addition of the ADLS would result in shorter duration night sky impacts to KOPs, character areas and SDAs. Because of the limited duration and frequency of anticipated aviation warning activations and visibility of warning lighting, the Proposed Action would result in long-term, short duration, intermittent **negligible** to **major** adverse impacts to KOPs, character areas and SDAs within distances described above. Impacts during decommissioning would be similar to the impacts during construction and installation: long term, short duration, and intermittent **negligible** to **major** adverse.

Presence of structures: The offshore components of the Project would be visible from coastal locations in New York, Connecticut, Rhode Island, and Massachusetts. Based on visual simulations as part of the VIA, the WTGs and/or OSSs would be all or partially visible on the horizon from shore where there are generally unobstructed views within the analysis area from 28 of the 37 KOPs evaluated (EDR 2021a). The WTGs and OSSs would be painted RAL 9010 Pure White or RAL 7035 Light Grey in accordance with BOEM guidelines. The effects of sun lighting, shade, and shadows would cause backlit contrasts and higher impacts for onshore and offshore views from the northeast, north, and northwest in relation to sun angle. The color contrast varies due to sun angles and atmospheric clarity shifting from white WTGs against a blue or gray backdrop to a dark gray WTG against a light gray backdrop. Distance between the viewer and the WTGs along with the curvature of the Earth affect how much of the WTG is visible from viewer locations and influence its visible scale and dominance.

The up to 100 WTGs and two OSSs, as shown in the visual simulations in COP Appendix U3 (EDR 2021a), would be viewed from variable distances along the ocean horizon depending on their distance from the 37 KOPs (7.6 nm [8.7 miles] minimum [it should be noted that this minimum distance was measured from Nomans Land Island which is an uninhabited island and National Wildlife Refuge] to 30 nm [34.6 miles] maximum) and result in variable degrees of impacts. Additionally, the curvature of the Earth, which influences the percentage of the turbine structure visible along the horizon is also a factor in the overall impacts. The WTGs would be more visually apparent when viewed from the northern and easterly shorelines due to the relationship of the Lease Area to KOPs (e.g., KOP MV02), which are approximately 11.8 nm (13.6 miles) distant. The scale of the 100 WTGs and two OSSs would become less perceivable as the distance from KOPs and/or character areas increases. Atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action would also influence visibility and perceivability from KOPs (e.g., NI10 - modified haze/sun, MV12 day vs night, MV05 day vs night), which may not be depicted in all visual simulations, or from other non-simulated locations that may have visibility within character areas. As a result, O&M would cause long-term **negligible** to **major** adverse impacts for the life of the Project. Impacts from decommissioning the 100 WTGs and two OSSs would be similar to construction impacts, **negligible** to **majo**r adverse.

Onshore Activities and Facilities

Light: Impacts would be reduced by the developer-committed EPM of switched vs. motion operational lighting, which would comply with local lighting regulations. Facility lighting would be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon, which would direct light sources downward and localize any light disturbance (vhb 2022). Due to the similarity of the existing lighting of the adjacent Davisville Substation with the OnSS and ICF (lighting masts assumed to be approximately 20 feet in height), screening by mature vegetation throughout the area as noted in Section 3.20.2.2.1, and developer-committed EPMs, the nighttime lighting impacts of the OnSS and ICF would cause long-term **negligible** adverse impacts to potential nighttime

viewers. Impacts during decommissioning would be similar to the impacts during construction and installation, short-term **negligible** to **minor** adverse.

Presence of structures: Based on the results of the viewshed analysis (EDR 2021a), the OnSS and ICF infrastructure (buildings, lighting protection, and transmission structures) could be visible from approximately 15% (approximately 2,928 acres) of the 3-mile visual study area not accounting for the influence of vegetative screening defined in the onshore VIA. The presence of existing intervening landscape vegetation along roadways and other viewing locations could further reduce the extent of visibility. For views beyond 0.5 miles, for example Wickford Historic District, Wickford Harbor/Wickford Village State Scenic Area, and Narragansett Bay, visibility, considering distance, vegetation screening, viewer perspective, etc., is anticipated to be the top 10-feet of the overhead transmission line structures which are the tallest structure at approximately 80-feet (EDR 2021b). Further discussion regarding potential impacts to viewsheds associated with historic or cultural viewsheds can be found in Section 3.10. Nevertheless, the OnSS and ICF would not be out of scale or character with the existing development present in the vicinity, which ranges from transit rail and four-lane roadway to residential to heavy industrial within .5 mile of the OnSS and ICF location. For this reason, the OnSS and ICF would result in long-term **negligible** adverse impacts to the viewer's and associated LCA. Impacts during decommissioning would be similar to the impacts during construction and installation.

3.20.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Light: Construction-related activities would add lighting used by offshore vessels and construction areas to the No Action Alternative. Construction of up to 100 WTGs and two OSSs would also add warning lighting to the No Action Alternative, which would be visible from several KOPs, character areas and SDAs. New lighting from the Proposed Action would increase in-water structures with lighting impacts from past, present, and reasonably foreseeable future projects (assumed to be 953 structures) for a combined total of 1,055 lighted structures within the GAA, a 10.7% increase in lighting compared to the No Action Alternative (see Table E4-1). Nighttime vessel and construction area lighting during construction of the Proposed Action would be limited in duration and cease when construction is complete. Atmospheric and environmental conditions would influence visibility and perceivability from KOPs, character areas and SDAs. Cumulatively, when combined with other past, present, and reasonably foreseeable future projects, the Proposed Action would result in long-term **negligible** to **major** adverse impacts to nighttime viewers and the existing night sky environment.

Presence of structures: Construction activities would add up to 100 additional WTGs and two OSSs to the No Action Alternative. As a result, approximately 90% of the total potential WTGs and OSSs in the GAA (1,055) would be associated with other future offshore wind development projects beyond the Proposed Action and at distances from KOPs, character areas and SDAs where atmospheric conditions and the curvature of the Earth influence visibility The position of the Proposed Action within the Lease Area, in relation to the other offshore wind development projects, shields or obscures visibility of those projects from KOPs in the northwestern to northeastern portions of the GAA (e.g., RI01, AIO5, and CI01). KOPs in these locations would have views of the Proposed Action as it is the closest project in relation to other projects. KOPs located along the western and eastern portions of the GAA (e.g., BI09, MV03 and NI10) would have increased visibility and therefore increased impacts related to future offshore wind projects in

addition to the Proposed Action (see Table G-48). When combined with other past, present, and reasonably foreseeable projects, the Proposed Action would result in long-term **negligible** (e.g., KOP MM 04) to **major** adverse cumulative impacts to KOPs, character areas and SDAs. Adverse impacts would be removed at Project decommissioning.

Onshore Activities and Facilities

Light: Onshore construction and O&M would add an O&M facility, OnSS, and ICF with nighttime security lighting to the No Action Alternative. These onshore structures and nighttime lighting sources would occur in areas of existing development or where similar infrastructure and development exists; would use or replace existing structures (O&M facility); and when considered cumulatively with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse impacts to the viewer's nighttime visual experience and inherent nighttime landscape character.

Presence of structures: Onshore construction and installation would add an ICF, and OnSS to the No Action Alternative. The O&M facility would utilize existing structures. The Proposed Action does not include any updates to ports. Any potential future port upgrades required to service the offshore wind industry would potentially result in similar **negligible** adverse visual impacts to KOPs, character areas and SDAs. The Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** adverse cumulative impacts to KOPs, character areas and SDAs.

3.20.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would introduce visible vessels, structures, and warning lighting to the GAA. BOEM anticipates the impacts resulting from the Proposed Action alone would range from short term to long term **negligible** to **major** adverse. Of the 60 impact determinations associated with KOPs, character areas and SDAs, 21 major, 21 moderate, 11 minor, and seven negligible adverse impacts were determined for the Proposed Action (see Appendix G); therefore, BOEM anticipates the overall impact on KOPs, character areas and SDAs from the Proposed Action to be **long term moderate to major adverse because** the overall effect would be substantial to dominant based on the largest number of impact determinations for the for the life of the Project, but the resource would be expected to recover completely after decommissioning. BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** to **major** adverse to KOPs, character areas and SDAs. Decommissioning after a project's life of up to 35 years would remove the cumulative visual impacts of the Project.

3.20.2.3 Alternatives C, D, E, and F

Table 3.20-1 provides a summary of IPF findings for these alternatives.

3.20.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would introduce visible vessels, structures, and warning lighting to the GAA. Analysis findings that identify an action alternative associated with Alternatives C, D, E, and F that has the greatest potential for reduced visual impacts (least impactful) as a result of the removal of turbines in relation to KOPs or character areas, have been carried forward in Table 3.20-1 rather than describe impacts for all action alternatives where differences are

negligible. Of the 12 action alternatives (C, D, E, and F); four alternatives (C1, D1+D2+D3, E1, and F) were determined to have a lesser degree of visual impacts to KOPs and SCAs than the remaining eight action alternatives and are described below.

Alternatives C1 and C2: Due to WTG placement, Alternative C2 would result in slightly lesser degree of impacts than Alternative C1. Alternative C2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs, with 10 of the 17 selected KOPs having major adverse impacts, four KOPs having moderate adverse impacts, and three KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,967 acres of visibility of Alternative C2 (15.3%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with approximately 96% of the OCA having visibility of Alternative C2. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area; overall, Alternative C2 would be visible to approximately 34.7 square miles (2.3%) of the combined SCAs and LCAs within the GAA. Due to the similarity in placement of WTGs, Alternatives C1 and C2 would result in similar impacts, and both alternatives would result in fewer impacts than the Proposed Action. Of the 40 impact determinations associated with KOPs, character areas and SDAs, 14 major, 13 moderate, eight minor, and five negligible adverse impacts were determined for Alternative C2 (Tables G-42 and G-43c).

Alternative D alternatives: Of the seven Alternative D alternatives, Alternative D1+D2+D3 would result in the least number of adverse impacts because of the combination of removed turbines as compared to the maximum case scenario for the Proposed Action. Alternative D1+D2+D3 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with 11 of the 37 selected KOPs having major adverse impacts, 15 KOPs having moderate adverse impacts, and 11 KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 28,840 acres of visibility of Alternative D1+D2+D3 (14.7%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to other action alternatives, with approximately 96% of the OCA having visibility of the Project. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse, similar to the Proposed Action, based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 31.1 square miles (2.1%) of the combined SCAs and LCAs would have visibility of Alternative D1+D2+D3 within the GAA. Of the 60 impact determinations associated with KOPs, character areas and SDAs, 15 major, 24 moderate, 12 minor and 9 negligible impacts were determined for Alternative D1+D2+D3 (Tables G-44a and G-45c).

Alternative E1 and E2: Due to the placement of WTGs, Alternative E1 would result in slightly less impacts than Alternative E2. Alternative E1 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA, with four of the 21 selected KOPs having major adverse impacts, 12 KOPs having moderate adverse impacts, and five KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse. with approximately 29,085 acres of visibility of Alternative E1 (14.9%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with approximately 96% of the OCA having visibility of the alternative. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 32.7 square miles (2.2%) of the combined SCAs and LCAs would have visibility of Alternative E1 within the GAA. Of the 44 impact determinations associated with KOPs, character areas

and SDAs, eight major, 21 moderate, seven minor, and eight negligible adverse impacts were determined for Alternative E1 (see Tables G-46 and G-47c).

Alternative E2 would result in short-term to long-term **negligible** to **major** adverse impacts to KOPs within the GAA; with one of the 16 selected KOPs having major adverse impacts, six KOPs having moderate adverse impacts, and nine KOPs having minor to negligible adverse impacts. Impacts to SDAs would range from **negligible** to **major** adverse, with approximately 29,385 acres of visibility of Alternative E2 (15.0%) of the approximately 195,701 acres of SDAs. Impacts to the OCA would be **major** adverse, similar to the Proposed Action, with approximately 96% of the OCA having visibility of the alternative. Impacts to SCAs and LCAs would range from **minor** to **moderate** adverse based on the sensitivity and degree of magnitude in relation to the character area. Overall, approximately 33.5 square miles (2.3%) of the combined SCAs and LCAs would have visibility of Alternative E2 within the GAA. Of the 39 impact determinations associated with KOPs, character areas and SDAs, five major, 15 moderate, seven minor, and 12 negligible adverse impacts were determined for Alternative E2 (see Tables G-46 and G-47c).

Alternatives E1 and E2 would not have as great of a reduced visual impact within the GAA. Due to the specific nature and development of Alternatives E1 and E2 related to reducing visual impacts to specific KOPs along the northeastern portion of the Lease Area associated with Martha's Vineyard (e.g., MV08, Aquinnah Overlook and MV12, Peaked Hill), KOPs in this geographic area would have greater reduced visual impacts as compared to other action alternatives. Additionally, some KOPs that are at a greater distance (e.g., AI05, Sachuest Point NWF) would also have reduced visual impacts based on orientation to the Lease Area.

Further information related to impacts to individual KOPs, character areas and SDAs associated with Alternatives C, D, and E are included in Appendix G.

Alternative F: Alternative F would reduce the number of WTGs installed in the Lease Area as compared to the maximum case scenario for the Proposed Action or any action alternative that it is combined with. The potential reduction of impacts would depend on viewer distance and be focused primarily on locations in closest proximity to the area of reduced WTGs. A reduction in WTGs installed would be expected to result in long-term **negligible** to **major** adverse impacts to KOPs, character areas and SDAs. However, the application of Alternative F cannot be fully evaluated until the specific WTGs to be removed are identified.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM anticipates that the overall impacts associated with Alternatives C2, D1+D2+D3, E1, and F or any other alternative option when combined with past, present, and reasonably foreseeable activities would be **negligible** to **major** adverse. This impact determination is due to the proximity of the Project within the Lease Area and in relation to KOPs, character areas and SDAs. Additionally, impacts would be variable based on the final alternative selected and range from 1,011 to 1,048 structures (WTGs and OSSs). Decommissioning would remove the cumulative visual impacts of the Project.

3.20.2.5 Mitigation

No potential additional mitigation measures for visual resources are identified in Appendix F Table F-2.

3.21 Water Quality

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

3.22 Wetlands and Other Waters of the United States

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

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APPENDIX A

Required Environmental Permits and Consultations

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Introduction

This appendix discusses required permitting and public, agency, and tribal involvement in the preparation of the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project) environmental impact statement (EIS). This involvement included formal consultations, cooperating agency exchanges, and a public scoping comment period.

Authorizations and permits are listed in Table A-1, and cooperating or participating federal agencies are described below. The Bureau of Ocean Energy Management (BOEM) has completed the following interagency milestones to date for the Project:

- Finalize purpose and need: April 19, 2021
- Concurrence on permitting timetable: April 19, 2021
- Issuance of notice of intent (NOI) to prepare an EIS: April 30, 2021
- Issuance of notice of correction: June 4, 2021
- Complete public scoping period: June 11, 2021
- Finalize Draft EIS alternatives: April 19, 2022

Other Federal and State Review

Table A-1 provides a discussion of other federal and state reviews required, including legal authority, jurisdiction of the agency, and the regulatory process involved.

Table A-1. Cooperating Federal and State Agencies, Required Environmental Permits, and Consultations for the Project

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval/Consultations	Status
Federal			
Advisory Council on Historic Preservation	Participating agency	None	Not applicable
BOEM	Lead federal agency	Construction and operations plan (COP) approval	Original COP filed with BOEM on October 30, 2020; COP update provided on April 29, 2021; COP update provided on December 15, 2021; COP update provided on July 21, 2022
National Park Service	Participating agency	None	Not applicable
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Cooperating agency	Letter of authorization (LOA) for incidental take regulations (ITRs) Essential fish habitat consultation Endangered Species Act (ESA) consultation	Planned
U.S. Department of Defense, U.S. Army Corps of Engineers	Cooperating agency	Clean Water Act Section 404/Rivers and Harbors Act of 1899 Section 10 Individual Permit	Planned
U.S. Department of Defense	Participating agency	None	Not applicable
U.S. Department of Transportation, Federal Aviation Administration	Participating agency	Obstruction evaluation/airport airspace analysis	Planned
U.S. Department of Homeland Security, U.S. Coast Guard	Cooperating agency	Private Aids to Navigation Permit	Planned

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval/Consultations	Status
U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement	Cooperating agency	None	Not applicable
U.S. Department of the Navy	Participating agency	None	Not applicable
U.S. Environmental Protection Agency	Cooperating agency	Outer Continental Shelf Air Permit	Planned
U.S. Fish and Wildlife Service	Participating agency	ESA consultation	Not applicable
State (portions of the Project within state jurisdiction)*			
State of Rhode Island Coastal Resources Management Council	Cooperating agency	Coastal Zone Management Act (CZMA) Consistency Certification Category B Assent/Submerged lands license Permit to Alter Freshwater Wetlands in the Vicinity of the Coast Application for Marine Dredging and Associated Activities	Filed on June 7, 2021 Filed on July 1, 2021 Filed on July 1, 2021 Filed on July 1, 2021
State of Rhode Island Department of Environmental Management	Cooperating agency	Section 401 and State Water Quality Certification/Rhode Island Pollutant Discharge Elimination System Construction General Permit (filed concurrently) Application for Marine Dredging and Associated Activities (see above)	Filed on August 3, 2021
Commonwealth of Massachusetts Office of Coastal Zone Management	Cooperating agency	CZMA Consistency Certification	Filed on June 7, 2021
Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development	Not applicable	National Historic Preservation Act (NHPA) Section 106 consultation	Not applicable

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval/Consultations	Status
Rhode Island Historical Preservation & Heritage Commission	Not applicable	NHPA Section 106 consultation	Not applicable
New York State Division for Historic Preservation	Not applicable	NHPA Section 106 consultation	Not applicable
Massachusetts Historical Commission	Not applicable	NHPA Section 106 consultation	Not applicable

* State agencies may be cooperating agencies under the National Environmental Policy Act.

Cooperating Agencies

As part of the National Environmental Policy Act (NEPA) process, BOEM invited other federal agencies and state, tribal, and local governments to consider becoming cooperating agencies in the preparation of the EIS. According to Council on Environmental Quality (CEQ) guidelines, qualified agencies and governments are those with "jurisdiction by law" or "special expertise" (40 CFR 1501.8). BOEM asked potential cooperating agencies to consider their authority and capacity to assume the responsibilities of a cooperating agency and to be aware that an agency's role in the environmental analysis neither enlarges nor diminishes the final decision-making authority of any other agency involved in the NEPA process. BOEM also provided potential cooperating agencies participating in the FAST-41 process with a written summary of expectations for cooperating agencies, including time schedules and critical action dates, milestones, responsibilities, scope, detail of cooperating agencies' contributions, and availability of pre-decisional information.

Cooperating agency status is provided in Table A-1. More specific details regarding federal agency roles and expertise are described below.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under its jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to the Marine Mammal Protection Act, as amended (MMPA) (16 USC 1361 et seq.); the regulations governing the taking and importing of marine mammals (50 CFR 216); the Endangered Species Act (ESA) (16 USC 1531 et seq.); and the regulations governing the taking, importing, and exporting of threatened and endangered species (50 CFR 222–226). In accordance with 50 CFR 402, NMFS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect marine resources listed as threatened or endangered. NMFS has additional responsibilities to conserve and manage fishery resources of the United States, which include the authority to engage in consultations with other federal agencies pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and 50 CFR 600 when proposed actions may adversely affect essential fish habitat (EFH). The MMPA is the only authorization for NMFS that requires NEPA compliance. NMFS intends to adopt BOEM's Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support the authorization.

NMFS has multiple roles in the NEPA process and EIS for this major federal action. First, NMFS has a responsibility to serve as a cooperating agency based on its technical expertise and legal jurisdiction over multiple trust resources. NMFS's role is to provide expert advice regarding the action's impact with respect to EFHs, as defined in the MSA, listed threatened and endangered species and designated critical habitat listed under the ESA, marine mammals protected by the MMPA, and commercial and recreational fisheries managed under the MSA.

Second, NMFS intends to adopt the EIS in support of its MMPA authorization decision after reviewing it and determining it to be sufficient. NMFS is required to review applications for incidental take under the MMPA, as amended (16 USC 1361 et seq.) and issue an ITA in the form of a Letter of Authorization

(LOA) for Incidental Take Regulations (ITRs) if appropriate. Revolution Wind, LLC (Revolution Wind) has submitted an application to NMFS for an ITR in conjunction with the construction and operations plan (COP) for *take*, as defined by the MMPA, of marine mammals incidental to Project construction and associated activities. The decision to issue an ITR under the MMPA is considered a major federal action requiring NEPA review. Therefore, NMFS has an independent responsibility to comply with NEPA. Consistent with the regulations published by the CEQ (40 CFR 1501.7(g)), NMFS intends to rely on the information and analyses in BOEM's EIS to fulfill its NEPA obligations for ITA issuance, if applicable. NMFS intends to adopt the final EIS for this purpose.

Bureau of Safety and Environmental Enforcement

The Bureau of Safety and Environmental Enforcement (BSEE) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under its jurisdiction by law and special expertise.

U.S. Coast Guard

The U.S. Coast Guard (USCG) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect navigation and safety issues that fall under its jurisdiction by law and special expertise. Upon lessee application, the USCG will issue a Private Aids to Navigation (PATON) permit for the marking and lighting of the wind turbine generators (WTGs), offshore substations (OSSs), and measurement buoys to alert mariners to potential hazards to navigation. A request for a Local Notice to Mariners (LNMs) publication will also be submitted to the USCG prior to vessel mobilization for construction activities to enable the USCG to issue the LNM.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect resources under its jurisdiction by law and special expertise. The EPA is responsible for issuing an Outer Continental Shelf (OCS) permit for the Project under the Clean Air Act.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency pursuant to 40 CFR 1501.8 because the scope of the Proposed Action and alternatives involves activities that could affect resources under its jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

Section 10 of the Rivers and Harbors Act, approved on March 3, 1899 (33 USC 403), prohibits the unauthorized obstruction or alteration of any navigable water of the United States. The construction of any structure in or over any navigable water of the United States; the excavating from or depositing of material in such waters; or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The instrument of authorization is designated a permit. The authority of the Secretary of the Army to prevent obstructions to navigation in navigable waters of the

United States was extended to artificial islands, installations, and other devices located on the seabed, to the seaward limit of the OCS, by Section 4(f) of the Outer Continental Shelf Lands Act of 1953, as amended (43 USC 1333(e)).

Section 404 of the Clean Water Act (33 USC 1344) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for the discharge of dredged or fill material into the waters of the United States at specified disposal sites (see 33 CFR 323.) The selection and use of disposal sites will be in accordance with guidelines developed by the Administrator of the EPA in conjunction with the Secretary of the Army and published in 40 CFR 230. If these guidelines prohibit the selection or use of a disposal site, the Chief of Engineers shall consider the economic impact on navigation and anchorage of such a prohibition in reaching their decision. Furthermore, the Administrator can deny, prohibit, restrict, or withdraw the use of any defined area as a disposal site whenever they determine, after notice and opportunity for public hearing and after consultation with the Secretary of the Army, that the discharge of such materials into such areas will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas, wildlife, or recreational areas (see 40 CFR 230).

The Section 10 activities associated with the Project may consist of the installation of WTGs, the installation of inter-array cables, the installation of export cables, and scour protection associated with the structures. Section 10 activities are regulated by the USACE between the mean high water mark and the limits of the OCS. The Section 404 fill activities associated with the Project may consist of the discharge of dredged material associated with the horizontal directional drilling installation at the landfall site, the placement of cable scour protection, the installation of temporary cofferdams, and temporary discharges of dredged or fill material associated with the installation of the export cable. Section 404 activities are regulated by the USACE between the high tide line and the 3-nautical-mile mark.

Issuance of Section 10 or Section 404 permits requires NEPA compliance, which will be met via adoption of BOEM's EIS and issuance of the record of decision.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is serving as a participating agency for the Project. The USFWS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect terrestrial resources listed as threatened or endangered, including species of concern. See the ESA section below for a summary of the ESA consultation to date with the USFWS.

National Park Service

The National Park Service (NPS) is serving as a participating agency because there are multiple important NPS resources within the Project vicinity, including the Block Island Southeast Light, Marble House, Ocean Drive Historic District, Bellevue Avenue Historic District, and The Breakers National Historic Landmarks (NHLs). There may also be Land and Water Conservation Fund State and Local Assistance Program sites impacted if more export cable locations are set. However, at this point in time the proposed cable landing at Quonset Business Park in North Kingstown, Rhode Island, is not expected to interact with any NPS units or program lands. Should any potential impacts to NPS units or program lands be identified and an NPS permit is required, the NPS will request a change to cooperating agency status under "jurisdiction by law" pursuant to 40 CFR 1501.8.

Consultations

The following section provides a summary and status of BOEM consultations as part of the Project (ongoing, complete, and the opinion or finding of each consultation). Section 1.4 of the COP provides a discussion of other federal and state consultation processes being led by Revolution Wind (vhb 2022).

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) requires that federal actions within and outside the coastal zone that have reasonably foreseeable effects on any coastal use or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program (CMP). On June 7, 2021, Revolution Wind submitted a federal consistency certification with the Commonwealth of Massachusetts Office of Coastal Zone Management (MA-CZM) and the Rhode Island Coastal Resources Management Council (RI CRMC) per 15 CFR 930.76. The CZMA federal consistency regulations at 15 CFR 930.60(b) allow for a stay of the required review period, if mutually agreed upon by both the applicant and the state agency. On July 2, 2021, MA-CZM requested additional information deemed necessary to determine consistency with the enforceable policies of its approved CMP and entered into a mutual agreement with Revolution Wind to stay the review for 8 months, beginning on July 7, 2021, with MA-CZM's review restarting on March 7, 2022. On March 7, 2022, both parties agreed to a second stay ending May 7, 2022.

On October 21, 2021, RI CRMC also requested additional information deemed necessary to make a consistency determination. On October 28, 2021, RI CRMC and Revolution Wind entered into an agreement to stay the CRMC's CZMA review until September 17, 2022.

At this time, Revolution Wind and these state agencies have mutually agreed to the following consistency decision dates:

- Massachusetts: October 7, 2022
- Rhode Island: December 21, 2022

The COP provides the necessary data and information under 15 CFR 930.58 (vhb 2022). The states' concurrence is required before BOEM could approve, or approve with conditions, the COP per 30 CFR 585.628(f) and 15 CFR 930.130(1).

Endangered Species Act

Section 7(a)(2) of the ESA of 1973, as amended (16 USC 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency could affect a protected species or its critical habitat, that agency is required to consult with either NMFS or the USFWS, depending upon the jurisdiction of the agencies. Pursuant to 50 CFR 402.07, BOEM has accepted designation as the lead federal agency for the purposes of fulfilling interagency consultation under Section 7 of the ESA for listed species under the jurisdiction of NMFS and the USFWS. BOEM is consulting on the proposed activities considered in this EIS with both NMFS and the USFWS for listed

species under their respective jurisdictions. Draft biological assessments have been prepared for submission to USFWS and NMFS. ESA consultations are expected to be completed by March 31, 2023.

Government-to-Government Consultation with Federally Recognized Indian Tribes

Executive Order (EO) 13175 commits federal agencies to engage in government-to-government consultation with tribal nations, and Secretarial Order No. 3317 requires U.S. Department of the Interior agencies to develop and participate in meaningful consultation with federally recognized tribal nations where a tribal implication may arise. A June 29, 2018, memorandum outlines BOEM's current tribal consultation policy (BOEM 2018). This memorandum states that "consultation is a deliberative process that aims to create effective collaboration and informed Federal decision-making" and is in keeping with the spirit and intent of the National Historic Preservation Act (NHPA) and NEPA, executive and secretarial orders, and U.S. Department of the Interior policy (BOEM 2018). BOEM implements tribal consultation policies through formal government-to-government consultation, informal dialogue, collaboration, and engagement.

BOEM conducted government-to-government consultations with the Narragansett Indian Tribe, the Mashantucket Pequot Tribal Nation, and the Mohegan Tribe of Indians of Connecticut in an overview of planned offshore wind development projects off southern New England in August 2018.

Between January 15 and 17, 2020, BOEM met again with the Mohegan Tribe of Indians of Connecticut, the Mashantucket Pequot Tribal Nation, and the Narragansett Indian Tribe to discuss multiple BOEM actions in the Rhode Island/Massachusetts Wind Energy Area. Concerns expressed by representatives from the tribes present included possible effects on marine mammals, other marine life, and the Nantucket Sound Traditional Cultural Property (TCP). One tribe emphasized the importance of open sea views to the east during sunrise, as well as the night sky, while others emphasized their long historical association with the sea and islands off southern New England and the critical role of fishing and shellfish gathering. All of the tribes emphasized the importance of understanding the interconnected nature of the human world, the sea, and the living things in both worlds.

On July 21, 2020, BOEM and the BSEE conducted three separate meetings with the Mashantucket Pequot Tribal Nation, the Wampanoag Tribe of Gay Head (Aquinnah), and the Mashpee Wampanoag Tribe. These meetings generally focused on developing mitigation measures for offshore wind project impacts, funding, and best practices. Concerns expressed by representatives from the tribes present included project effects and layout, a desire to redefine the Nantucket Sound TCP boundaries, recommendations for mitigation measures, aboriginal rights and titles, communication with developers, and cumulative effects of the present and future offshore wind projects in the area.

On August 20, 2020, BOEM consulted with the Delaware Tribe of Indians, Mashantucket Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah) to discuss the impacts of offshore wind developments on marine mammals. This included an overview of the consultation process and environmental review, the BOEM Environmental Studies Program and process, existing and upcoming studies related to North Atlantic right whales, and the marine mammal analysis and findings noted in the Vineyard Wind 1 supplemental EIS. The meeting concluded with some action items for BOEM, including to provide the above-referenced consulting parties with additional reports and

to research funding options to provide tuition assistance for tribal members interested in participating in the Protected Species Observer training certificate program.

On March 12, 2021, BOEM consulted with the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah) to discuss the proposed nomination of a TCP district to the National Register of Historic Places (NRHP) off the coast of Massachusetts. The TCP district proposed by the two Wampanoag tribes would encompass the lands and waters associated with the Wampanoag culture hero Moshup, including the Nantucket Sound TCP and the Vineyard Sound and Moshup's Bridge TCP identified during consultations for the Vineyard Wind 1 Project. The representatives from the tribes informed BOEM that the proposed TCP district was best described as a cultural landscape: a geographic area, including both cultural and natural resources and the wildlife therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. The representatives from the tribes stated that, in their opinion, any nomination should not be limited to the activities and lands associated with Moshup but also include detailed documentation of Wampanoag history in the area, such as their participation in the whaling industry, detailing the role the Wampanoag peoples have played in the history of the region. In a subsequent meeting on April 15, 2021, BOEM informed the representative from the Wampanoag Tribe of Gay Head (Aquinnah) that BOEM's Environmental Studies Program had developed a proposal for a collaborative ethnographic and historic research project with the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe to collect, document, and report information that could be used by the tribes to complete an NRHP nomination for the proposed TCP district.

On April 9, 2021, BOEM held a government-to-government consultation meeting with representatives from the Delaware Tribe of Indians, Mashantucket Pequot Tribal Nation, Mashpee Wampanoag Tribe, and Wampanoag Tribe of Gay Head (Aquinnah). Most of the meeting focused on topics and issues applicable to all proposed offshore wind projects off the coast of New England, including the Project. During the meeting, representatives from the tribes voiced concerns about potential Project-based and cumulative impacts to water quality; marine mammals; coastal habitats; benthic communities; culturally, economically, and historically significant fisheries and shellfish populations; chemical pollutants; the financial and time burden on tribes of participating in multiple, simultaneous offshore wind project reviews; visual impacts on TCPs; and preserving the marine and terrestrial environments for future generations, particularly the current and future ability of tribal youth to perform sacred ceremonies and have safe havens for traditional cultural practices in the future. In addition to discussing these concerns, representatives from the tribes also recommended that BOEM consider creating a single offshore export cable corridor for all projects off the coasts of Rhode Island and Massachusetts and requested that BOEM consult with federally recognized tribes on all proposed offshore wind projects as a single federal action rather than on a project-by project basis.

In April 2021, BOEM invited by individual letter and email the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, and Delaware Nation to join the EIS process as cooperating agencies, to participate in scoping, to meet government-to-government on the Project, and to consult under NHPA Section 106. The invitations and the NOI for the Project notified tribes that BOEM would be using the NEPA substitution process for completing the steps of NHPA Section 106 pursuant to 36 CFR 800.8. (See National Historic

Preservation Act section below.) BOEM had earlier, in December 2020, notified the consulting tribes of its intent to apply this NEPA substitution process on its future offshore wind development reviews and held a workshop on this process open to tribes in January 2021.

Officials with the Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) have attended cooperating agency meetings to date. BOEM received comments from the tribes during June 2021 cooperating agency meetings in the scoping of alternatives and weighed these in the identification of alternatives to consider in detailed EIS analyses. The Mashantucket Pequot Tribal Nation and the Wampanoag Tribe of Gay Head (Aquinnah) also provided written comments for scoping. Comments received from tribes on alternatives included a co-located export cable corridor to be shared with other offshore projects and RWF setbacks and different configurations of WTG layouts to protect the environment (water, wildlife, and other natural and heritage resources) as well as to set back WTGs from land to address visual and cultural impact concerns. A setback option that would restrict/maximize the distance of WTGs from Massachusetts islands was carried forward by BOEM to detailed analyses (i.e., Alternative E). A marine habitat alternative (Alternative C) was also carried forward to detailed analysis based on the comments of many consulting parties, including participating tribes. A draft scoping report was provided for cooperating agency review in June 2021, including to participating tribes.

On August 2, 2021, BOEM held a government-to-government meeting with the Wampanoag Tribe of Gay Head (Aquinnah) to discuss visual effects from the South Fork Wind Farm (SFWF) and RWF. The Wampanoag Tribe of Gay Head (Aquinnah) provided comments, and BOEM responses on the agency's tribal consultation practices to date on offshore wind development and the tribe's expressed concerns with the proximity of the SFWF and RWF lease areas and the consideration of alternatives.

On August 13, 2021, BOEM held a government-to-government meeting on RWF and Vineyard Wind South with the Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Delaware Tribe of Indians, and Delaware Nation. The meeting discussed BOEM's decision to use the NEPA substitution process for NHPA Section 106 compliance; cooperating agency status for tribes during NEPA EIS development; tribal land considerations on the OCS; power purchase agreements; BOEM's use of project design envelopes for project reviews; export cables; vessel traffic corridors; horizontal directional drilling at landfall sites; terrestrial archaeology; cumulative visual impacts; traditional cultural practices; potential impact to marine mammals; and project schedules and FAST-41.

On February 3, 2022, BOEM held a government-to-government meeting on RWF with the Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah). The meeting discussed tribal land considerations on the OCS, export cables, terrestrial archaeology, marine archaeology, alternatives, cumulative visual impacts, Project schedule, and FAST-41.

On May 2, 2022, BOEM held a government-to-government meeting specifically with the chairwoman, tribal historic preservation office, and council members of the Wampanoag Tribe of Gay Head (Aquinnah). In the meeting, BOEM introduced and discussed the overall renewable energy program and process and summarized details and status of projects off the coast of New England. Topics identified for future discussion included cumulative visual simulations and resource impacts, the transmission process

that is part of a lease, decommissioning process and oversight, proposed mitigation plans and agreements, and the tribal capacity building initiatives.

On June 1, 2022, BOEM held a government-to-government meeting with the chairwoman and council members of the Wampanoag Tribe of Gay Head (Aquinnah). This meeting was a follow-up to the May 2 meeting to continue the conversation on various topics and tribal concerns related to the Project as well as to offshore wind development off the New England coast collectively.

On June 2, 2022, the BOEM director met in-person with the Mashpee Wampanoag Tribe to provide the tribal council with an overview of the current state of wind farm permitting off the coast of New England, including Gulf of Maine; to discuss and receive feedback on the Project and regional biological and economic concerns and potential mitigation strategies; to discuss and receive feedback on cumulative visual impacts and simulations; and to discuss and receive feedback on other programmatic topics, including transmission as part of a lease and capacity building initiatives.

BOEM continues to consult with these and other tribes on developments in offshore wind. Additional government-to-government consultations are planned for the future.

As part of COP development, Revolution Wind also conducted prior coordination with engaged tribes, State Historic Preservation Officers, and other stakeholders identified as having potential to inform the design process (see COP Appendix A).

Marine Mammal Protection Act

The MMPA was enacted to protect and conserve marine mammals and established a general moratorium on the taking and importation of marine mammals, with certain enumerated exceptions. Unless an exception applies, the act prohibits persons or vessels subject to the jurisdiction of the United States from taking any marine mammal in waters or on lands under the jurisdiction of the United States or on the high seas (16 USC 1372(a)(1), (a)(2)). Section 101(a) of the act provides the prohibitions for the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment (i.e., injury and/or disruption of behavioral patterns). Sections 101(a)(5)(A) and (D) of the act provide the exceptions to the prohibition on take, which give NMFS the authority to authorize the incidental but not intentional take of small numbers of marine mammals, provided certain determinations are made and statutory and regulatory procedures are met. Entities seeking to obtain authorization for the incidental take of marine mammals under NMFS jurisdiction must submit such a request (in the form of an application). Incidental Take Authorizations (ITAs) may be issued as either 1) regulations and associated letters of authorization or 2) incidental harassment authorizations when a proposed action will not result in a potential for serious injury and/or mortality or where any such potential can be negated through required mitigation measures. NMFS also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals (50 CFR 216) and produced Office of Management and Budget (OMB)–approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Once NMFS determines an application is adequate and complete, NMFS has a corresponding duty to determine whether and how to authorize take of marine mammals incidental to the activities described in the application. To authorize the incidental take of marine mammals, NMFS evaluates the best available scientific information to determine whether the take would have a negligible impact on the

affected marine mammal species or stocks and an unmitigable impact on their availability for taking for subsistence uses. NMFS must also prescribe the "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, and on the availability of those species or stocks for subsistence uses, as well as monitoring and reporting requirements.

NMFS received an application for an ITR from Revolution Wind, which was deemed complete on February 28, 2022, and published in the *Federal Register* on March 21, 2022 (National Oceanic and Atmospheric Administration 2022). As outlined above, NMFS reviews applications to determine whether to issue an authorization for the activities described in the application.

National Historic Preservation Act

The NHPA (54 USC 306108 *et seq.*) requires federal agencies to consider the effects of their undertakings on historic properties, to the maximum extent possible plan and act to minimize harm to NHLs, and afford the Advisory Council on Historic Preservation an opportunity to comment. BOEM has determined that approving a COP constitutes an undertaking subject to Section 106 of the NHPA and is implementing the Section 106 process (36 CFR 800). The construction of WTGs, installation of electrical support cables, and development of staging areas are ground- or seafloor-disturbing activities that could directly affect archaeological resources. The presence of WTGs could also introduce visual elements out of character with the historic setting of historic structures or landscapes; in cases where historic setting is a contributing element of historic properties' eligibility for the NRHP, the Project could affect those historic properties, including NHLs. NHLs that may be affected by the undertaking will be addressed according to Section 110(f) of the NHPA pursuant to 36 CFR 800.10.

The regulations at 36 CFR 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR 800.3–800.6. This process is known as "NEPA substitution for Section 106," and BOEM is using this process and documentation prepared under NEPA to also comply with Section 106. Under NEPA substitution for Section 106 (NEPA Substitution), BOEM is using the public involvement requirements under NEPA to also seek public involvement in its Section 106 review, pursuant to 36 CFR 800.2(d)(3). EIS Appendix J includes BOEM's draft finding of adverse effect, which includes a description and summary of BOEM's consultation to date. BOEM will continue consulting with the Connecticut, Rhode Island, Massachusetts, and New York SHPOs; ACHP; federally recognized tribal nations, and the consulting parties regarding the finding of adverse effect and the resolution of adverse effects. BOEM has and will be conducting Section 106 consultation meeting(s) on the finding of adverse effect and the resolution of adverse effects, and the agency will be requesting the consulting parties to review and comment on the finding of adverse effect and proposed resolution measures. Through NEPA Substitution, resolution of adverse effects will be documented in a memorandum of agreement (MOA) with the consulting parties, concluded prior to the issuance of the record of decision.

BOEM fulfilled public involvement requirements for Section 106 of the NHPA through the NEPA public scoping and public meetings process, pursuant to 36 CFR 800.2(d)(3). The scoping summary report (SWCA Environmental Consultants n.d. [2021]), available on BOEM's Project-specific website, summarizes comments on historic preservation issues. BOEM initiated review under NEPA Substitution on April 2, 2021, with letters sent to identify consulting parties for this undertaking sent between April 2 and 20, 2021. Letters were then sent between May 11 and 12, 2021, to initiate consultation with those parties previously identified for the undertaking. A list of the consulting parties to date for the RWF

project is provided in EIS Appendix J. BOEM held an initial consultation meeting with consulting parties on December 17, 2021, to discuss the area of potential effects (APE) and the identification of historic properties within the APE. A second consultation meeting with consulting parties was held April 8, 2022, to discuss the identification of historic properties and potential effects on historic properties; and a third consultation meeting is anticipated in August or September 2022 to discuss adverse effects and their resolution. BOEM's final EIS will include treatment measures for resolving adverse effects to historic properties. An executed MOA among BOEM, the ACHP, SHPO(s), and the consulting parties will detail final resolution measures to resolve adverse effects, including avoidance, minimization, and mitigation measures.

EO 13007, Indian Sacred Sites, directs federal land management agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. BOEM management actions within the OCS may not directly affect Indian sacred sites; however, BOEM recognizes its undertakings could affect the physical integrity or ceremonial use of Indian sacred sites located on submerged federal lands on the OCS. As stated previously in the Government-to-Government Consultation with Federally Recognized Indian Tribes section, BOEM is also consulting with Indian tribes on these matters in accordance with EO 13175.

Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to Section 305(b) of the MSA, federal agencies are required to consult with NMFS on any action that may result in adverse effects on EFH. NMFS regulations implementing the EFH provisions of the act can be found at 50 CFR 600. As provided for in 50 CFR 600.920(b), BOEM has accepted designation as the lead agency for the purposes of fulfilling EFH consultation obligations under Section 305(b) of the act. Certain OCS activities authorized by BOEM may result in adverse effects on EFH and therefore require consultation with NMFS. BOEM is developing a draft EFH assessment concurrent with this EIS. NMFS anticipates receipt of the complete EFH assessment from BOEM and initiation of the EFH consultation on November 1, 2022.

Development of Environmental Impact Statement

This section provides an overview of the development of the EIS, including public scoping, cooperating agency involvement, and distribution of the EIS for public review and comment.

Scoping

On April 30, 2021, BOEM issued an NOI to prepare an EIS consistent with the regulations implementing NEPA (42 USC 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (BOEM 2021a). The NOI initiated a public scoping period from April 30 through June 1, 2021. During this time, input from federal agencies, tribes, state and local governments, and the general public was gathered regarding the potential of significant resources and issues, impact-producing factors, reasonable alternatives (e.g., size, geographic, seasonal, or other restrictions on construction and siting of facilities and activities), and potential mitigation measures to be analyzed in the EIS as well as provide additional information.

A correction to the NOI was issued by BOEM on June 4, 2021, which reopened the public scoping period (BOEM 2021b), allowing for comments to be received by June 11, 2021. The correction addressed and

clarified two statements in the NOI regarding the energy capacity of the proposed wind farm and its distance from shore.[1]

BOEM accepted comment submissions on the NOI via the following mechanisms:

- Electronic submissions received via www.regulations.gov on docket number BOEM-2021-0029
- Hard copy comment letters submitted to BOEM via traditional mail
- Emails submitted to BOEM
- Hard copy comment cards and/or letters received during each of the public scoping meetings
- Comments submitted verbally during the listening sessions of each of the three virtual public scoping meetings

BOEM held three virtual public scoping meetings on May 13, May 18, and May 20, 2021. Each virtual public scoping meeting included a presentation, listening session, and a question and answer session, all available on BOEM's website at https://www.boem.gov/Revolution-Wind-Scoping-Virtual-Meetings.

Summary of Scoping Comments

BOEM reviewed and considered, as appropriate, all scoping comments in the development of the Draft EIS and used the comments to identify alternatives for analysis. The scoping summary report (SWCA Environmental Consultants n.d. [2021]) summarizing the 42 submissions received and the methods for analyzing them is available on BOEM's website at https://www.boem.gov/Revolution-Wind. In addition, all public scoping submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2021-0029" in the search field. As detailed in the scoping summary report, the resource areas or NEPA topics most referenced in the scoping comments include birds, marine mammals, effects analysis, socioeconomics, commercial fishing, mitigation, wildlife (general), bats, essential fish habitat and finfish, cumulative impacts, and sea turtles.

[1] Replaced the sentence "The project will deliver 704 MW of power to the New England energy grid." with "The project would have the capacity to deliver up to 880 MW of power to the New England energy grid, satisfying the current PPA total of 704 MW." Also replaced the sentence "The wind turbine generators, offshore substations, array cables, and substation interconnector cables would be located on the [Outer Continental Shelf] approximately 17.4 nautical miles (20 statute miles) south of the coast of Rhode Island." with "The wind turbine generators, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf (OCS) approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines."

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———. 2021b. Notice of Intent To Prepare an Environmental Impact Statement for Revolution Wind LLC's Proposed Wind Energy Facility Offshore Rhode Island; Reopening of Comment Period and Corrections. *Federal Register* 86(106):30068–30069.

National Oceanic and Atmospheric Administration. 2022. Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Construction and Operation of the Revolution Wind Offshore Wind Farm Offshore of Rhode Island. *Federal Register* 87(54):15942–15944.

SWCA Environmental Consultants. n.d. [2021]. *Revolution Wind Farm and Revolution Wind Export Cable Project Environmental Impact Statement Scoping Summary Report*. Available at: https://www.boem.gov/Revolution-Wind. In preparation.

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APPENDIX B

List of Preparers and Reviewers, References Cited, and Glossary

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LIST OF PREPARERS AND REVIEWERS

Table B-1. Bureau of Ocean Energy Management Contributors

Name	Role/Resource Area
National Environmental Policy Act (NEPA) Coordinator	
Olivier, Trevis	NEPA coordinator
Segarra, Katherine	NEPA coordinator
Resource Scientists and Contributors	
Baker, Arianna	Navigation and vessel traffic; military uses
Bedard, Justin	Cultural resources; government-to-government consultation
Bhandari, Doleswar	Socioeconomics
Bigger, David	Birds; bats; coastal habitats; terrestrial and coastal fauna; wetlands; USFWS Endangered Species Act (ESA) consultation
Caporaso, Alicia	Benthic resources
Carrier, Brandi	Project coordinator
Chaiken, Emma	Commercial fisheries and for-hire recreational fishing
Chaky, Sindey	Land use and coastal resources
Charpentier, Nicole	Coastal Zone management Act coordinator
Conrad, Alexander	Marine acoustics and sound exposure
Damour, Melanie	Navigation and vessel traffic; visual resources
de Zeeuw, Maureen	Birds; bats; coastal habitats
Glenn, Tre	Marine mammals; sea turtles; birds; bats; National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) ESA consultation
Heinze, Martin	Demographics, employment, and economics
Hesse, Jeffrey T.	Military uses
Howson, Ursula	NOAA NMFS essential fish habitat (EFH) consultation
Jensen, Mark	Demographics, employment, and economics
Johnson, Stacey	NEPA compliance
Jones, Douglas	Cultural resources; government-to government consultations
Lilley, Meredith	Project coordinator
Luton, Harry	Environmental justice; land use; recreation and tourism
McCarty, John	Recreation and tourism; visual resources
Merritt, Stacie	Air quality
Miller, Jennifer	Alternatives, geophysical, cable burial and routing
Morin, Michelle	Chief, Environment Branch for Renewable Energy; NEPA compliance

Name	Role/Resource Area
Nord, Beth	Marine mammals; sea turtles
Ren, Cholena	Air quality
Reuther, Dustin	Environmental justice, land use, recreation and tourism
Schiff, John	Water quality
Slayton, Ian	Cumulative impacts; air quality
Sorset, Scott	Cultural resources
Stokely, Sarah	Cultural resources; Section 106 consultations
Steen, Mariana	Benthic resources; invertebrates; finfish and essential fish habitat; NOAA NMFS EFH consultation
Stromberg, Jessica	Project coordinator
Sullivan, Kimberly	Environmental justice
Vaughn, Sarah	Water quality
White, Timothy	Birds; bats
Wisman, Jeri	Birds; bats; terrestrial and coastal fauna; wetlands; USFWS ESA consultation

Table B-2. Reviewers

Name	Title	Agency
Brown, William	Chief Environmental Officer	U.S. Bureau of Ocean Energy Management (BOEM)
Segarra, Katherine	NEPA Coordinator	U.S. Bureau of Ocean Energy Management
Olivier, Trevis	NEPA Coordinator	U.S. Bureau of Ocean Energy Management
Giordano, Juliette	Lead Environmental Protection Specialist	Bureau of Safety and Environmental Enforcement
Hildreth, Emily	Renewable Energy Policy Specialist	U.S. Bureau of Ocean Energy Management
Melendez-Arreaga, Pedro	Solicitor	U.S. Department of the Interior, Office of the Solicitor
Vorkoper, Stephen	Solicitor	U.S. Department of the Interior, Office of the Solicitor
Timmerman, Timothy	Director	U.S. Environmental Protection Agency Region 1, Office of Environmental Review
Engler, Lisa	Director	Massachusetts Office of Coastal Zone Management
Crocker, Julie	Endangered Fish Branch Chief, GARFO Protected Resources Division	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)

Name	Title	Agency
Tuxbury, Susan	Fishery Biologist/Wind Program Coordinator, GARFO Habitat and Ecosystems Services Division	NOAA NMFS
Gray, Terry	Acting Director	Rhode Island Department of Environmental Management (RIDEM)
Amerault, Suzanne	Assistant to the Acting Director	RIDEM
Willis, Jeffrey	Acting Executive Director	Rhode Island Coastal Resource Management Council
Handell, Naomi	Project Manager, USACE, New York District Regulatory Branch-Eastern Section	U.S. Army Corps of Engineers (USACE)
Jacek, Christine	Project Manager, USACE New England District	USACE
Detweiler, George	Team Leader, Office of Navigation Standards	U.S. Coast Guard (USCG)
Desautels, Michele	District 1 Agency Point of Contact	USCG

Table B-3. Consultants

Name	Role/Resource Area
Project Management/Coordinators	
Fluder, Joseph; SWCA	Corporate sponsor
Hartmann, Christine; SWCA	Project manager; all sections
Wilmot, Susan; SWCA	Deputy project manager; all sections
Smith, Earl; SWCA	Geographic information systems
Diais, Madeline; SWCA	Administrative record
Subject Matter Experts	
Berger, Chris; Confluence Environmental Company, Inc. (Confluence)	Sea turtles
Bockey, Chris; SWCA	Visual
Bush, Diane; SWCA	Editor
Clapsaddle, Madison; SWCA	Appendices
Cziesla, Chris; Confluence	Marine mammals, sea turtles
Doyle, Eric, Confluence	Benthic resources; invertebrates; EFH/finfish; marine mammals; sea turtles; other (marine) uses; land use and coastal infrastructure
Faulkner, Geneva; Confluence	Land use and coastal infrastructure; other uses

Name	Role/Resource Area
Fisher, Michael; Northern Economics, Inc. (NEI)	Navigation and vessel traffic
Giblin, Kara; SWCA	Wetlands and WOTUS
Gilmer, Anna; SWCA	Cultural resources
Guest, Joanna; SWCA	Air quality
Hartley, Marcus; NEI	Commercial fisheries and for-hire recreational fishing; Demographics, employment, and economics
Himmelstein, Ashley; Christopher Goodwin & Associates (RCGA)	Cultural resources marine archaeology
Hogel, Adrian; SWCA	Bats; birds; coastal habitats and fauna; wetlands and WOTUS
Klewicki, Laura; SWCA	Water quality
Linehan. Kerri; SWCA	Editor
Maymon, Jeffrey; RCGA	Cultural resources—marine archaeology
McDonald, Kelly; Confluence	Benthic resources; invertebrates
Novak, Grant; Confluence	Benthic resources; invertebrates; EFH/finfish; marine mammals; sea turtles; other (marine) uses; land use and coastal infrastructure
Phillips, Scott; SWCA	Cultural resources—terrestrial resources, terrestrial archaeology, historic architecture, viewshed resources; tribal consultation
Sato, Irene; Confluence	EFH/finfish
Schug, Donald; NEI	Demographics, employment, and economics; environmental justice
Smith, Debbi; SWCA	Formatter and 508 specialist
Sohm, Brad; SWCA	Air quality
Soncarty, Chris; Confluence	Marine mammals; sea turtles; biological assessments; EFH/finfish
Tucker Burfitt, Linda; SWCA	Editor
Wilmot, Sue; SWCA	Recreation and tourism; water quality
Witzens, Kelcie; SWCA	Formatter and 508 specialist

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GLOSSARY

Term	Definition
affected environment	Environment as it exists today that could be impacted by the proposed Project
ancient submerged landform feature	A landform as it was in ancient times
algal blooms	Rapid growth of the population of algae, also known as algae bloom
allision	A moving ship running into a stationary ship
anthropogenic	Generated by human activity
applicant	Revolution Wind, LLC
archaeological resource	Historical place, site, building, shipwreck, or other archaeological site on the American landscape
automatic identification system	Automatic tracking system used on vessels to monitor ship movements and avoid collision
baleen whale	A cetacean with baleens (whalebones) instead of teeth
below grade	Below ground level
benthic	Related to the bottom of a body of water
benthic resources	The seafloor surface, the substrate itself, and the communities of bottom-dwelling organisms that live within these habitats
Cetacea	Order of aquatic mammals made up of whales, dolphins, porpoises, and related lifeforms
coastal habitat	Coastal areas where flora and fauna live, including salt marshes and aquatic habitats
coastal waters	Waters in nearshore areas where bottom depth is less than 98.4 feet
coastal zone	The lands and waters starting at 3 nautical miles from the land and ending at the first major land transportation route
cofferdam	A watertight enclosure pumped dry to permit construction work below the waterline
commercial fisheries	Areas or entities raising and/or catching fish for commercial profit
commercial-scale wind energy facility	Wind energy facility usually greater than 1 megawatt that sells the produced electricity
criteria pollutant	One of six common air pollutants for which the U.S. Environmental Protection Agency sets National Ambient Air Quality Standards: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, or sulfur dioxide
critical habitat	Geographic area containing features essential to the conservation of threated or endangered species. This is a specific term and designation within the U.S. Endangered Species Act.

Term	Definition
cultural resource	Historical districts, objects, places, sites, buildings, shipwrecks, and archeological sites on the American landscape, as well as sites of traditional, religious, or cultural significance to cultural groups, including Native American tribes
cumulative impacts	Impacts that could result from the incremental impact of a specific action, such as the proposed Project, when combined with other past, present, or reasonably foreseeable future actions or other projects; can occur from individually minor, but collectively significant actions that take place over time
demersal	Living close to the ocean floor
design envelope	The range of proposed Project characteristics defined by the applicant and used by the Bureau of Ocean Energy Management (BOEM) for purposes of environmental review and permitting
dredging	Removal of sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies
duct bank	Underground structure that houses the onshore export cables, which consists of polyvinyl chloride (PVC) pipes encased in concrete
ecosystem	Community of interacting living organisms and nonliving components (such as air, water, soil)
environmental protection measure (EPM)	Measure proposed in a COP to avoid or minimize potential impacts
electromagnetic field	A field of force produced by electrically charged objects and containing both electric and magnetic components
endangered species	A species that is in danger of extinction in all or a significant portion of its range
Endangered Species Act–listed species	Species listed under the Endangered Species Act
ensonified	The process of filling with sound
environmental consequences	The potential impacts that the construction, operations, maintenance, and decommissioning of the proposed Project would have on the environment
environmental justice communities	Minority and low-income populations affected by the proposed Project
essential fish habitat	“Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 Code of Federal Regulations 600)
export cables	Cables connecting the wind facility to the onshore electrical grid power
finfish	Vertebrate and cartilaginous fishery species, not including crustaceans, cephalopods, or other mollusks
for-hire commercial fishing	Commercial fishing on a for-hire vessel, i.e. a vessel on which the passengers make a contribution to a person having an interest in the vessel in exchange for carriage
for-hire recreational fishing	Fishing from a vessel carrying a passenger for hire who is engaged in recreational fishing

Term	Definition
foundation	The bases to which the wind turbine generators and offshore substation are installed on the seabed. Five alternative foundation designs were considered and reviewed for the Project (Section 2.2.2.2 of the COP): monopile; piled three-, four-, or six-legged jacket; suction caisson jackets; monopod suction caisson; or gravity-based structure. Monopile is the selected foundation type for the Project.
hard-bottom habitat	Benthic habitats comprised of hard-bottom (e.g., cobble, rock, and ledge) substrates
historic property	Prehistoric or historic district, site, building, structure, or object that is eligible for or already listed in the National Register of Historic Places. Also includes any artifacts, records, and remains (surface or subsurface) related to and located within such a resource
horizontal directional drilling	Trenchless technique for installing underground cables, pipes, and conduits using a surface-launched drilling rig
hull	Watertight frame or body of a ship
inter-array cables	Cables connecting the wind turbine generators to the offshore substations
interconnection facility	Substation connecting the proposed Project to the existing bulk power grid system
invertebrate	Animal with no backbone
jack-up vessel	Mobile and self-elevating platform with buoyant hull
jet plow	Method of submarine cable installation equipment that primarily uses water jets to fluidize soil, temporarily opening a channel to enable the cable to be lowered under its own weight or be pushed to the bottom of the trench via a cable depressor.
knot	Unit of speed equaling 1 nautical mile per hour
landing site	The shoreline landing site at which the offshore cable transitions to onshore
Lease Area	The entire area that Revolution Wind, LLC purchased from BOEM. The RWF must be within the Lease Area.
marine mammal	Aquatic vertebrate distinguished by the presence of mammary glands, hair, three middle ear bones, and a neocortex (a region of the brain)
marine waters	Waters in offshore areas where bottom depth is more than 98.4 feet
mechanical cutter	Method of submarine cable installation equipment that involves a cutting wheel or excavation chain to cut a narrow trench into the seabed allowing the cable to sink under its own weight or be pushed to the bottom of the trench via a cable depressor.
mechanical plow	Method of submarine cable installation equipment that involves pulling a plow along the cable route to lay and bury the cable. The plow's share cuts into the soil, opening a temporary trench which is held open by the side walls of the share, while the cable is lowered to the base of the trench via a depressor. Some plows may use additional jets to fluidize the soil in front of the share.
monopile or monopile foundation	A long steel tube driven into the seabed that supports a tower

Term	Definition
National Ambient Air Quality Standards	Limits on atmospheric concentration of six criteria pollutants that are common in outdoor air and considered harmful to public health and the environment as established by the U.S. Environmental Protection Agency under authority of the Clean Air Act.
nautical mile	A unit used to measure sea distances and equivalent to approximately 1.15 miles
offshore Revolution Wind Export Cable	Export cables located in state or federal waters
offshore substation	The interconnection point between the wind turbine generators and the export cable; the necessary electrical equipment needed to connect the inter-array cables to the offshore export cables
onshore transmission cable	Export cables located on land
operations and maintenance facilities	Would include offices, control rooms, warehouses, shop space, and pier space
outer continental shelf	All submerged land, subsoil, and seabed belonging to the United States but outside of states' jurisdiction
pile	A type of foundation akin to a pole
pile driving	Installing foundation piles by driving them into the seafloor
pinnipeds	Carnivorous, semiaquatic, fin-footed marine mammals, also known as seals
plume	Column of fluid moving through another fluid
private aids to navigation	Visual references operated and maintained by the U.S. Coast Guard, including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation
Project	The siting and development of the Revolution Wind Farm and the Revolution Wind Export Cable
protected species	Endangered or threatened species that receive federal protection under the Endangered Species Act of 1973 (as amended)
right-of-way	Registered easement on private or government land that allows access by another entity. For purposes of renewable energy development of the Outer Continental Shelf (OCS), BOEM defines a right-of-way grant as an authorization issued by BOEM under 30 CFR 585 Subpart B to use a portion of the OCS for the construction and use of a cable or pipeline for the purpose of gathering, transmitting, distributing, or otherwise transporting electricity or other energy product generated or produced from renewable energy but does not constitute a project easement under Subpart B. The term also means the area covered by the authorization.
ruderal	Growing on waste ground or among refuse
scour protection	Protection consisting of rock and stone that would be placed around all foundations to stabilize the seabed near the foundations as well as the foundations themselves
sessile	Attached directly by the base

Term	Definition
soft-bottom habitat	Benthic habitats include soft-bottom (i.e., unconsolidated sediments) and hard-bottom (e.g., cobble, rock, and ledge) substrates, as well as biogenic habitat (e.g., eelgrass, mussel beds, and worm tubes) created by structure-forming species
Revolution Wind Farm (RWF)	The work area containing all proposed wind turbine generators, offshore substations, and inter-array cables
substrate	Earthy material at the bottom of a marine habitat; the natural environment that an organism lives in
suspended sediments	Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom. Such material remains in suspension due to the upward components of turbulence and currents, and/or by suspension.
threatened species	A species that is likely to become endangered within the foreseeable future
tidal energy project	Project related to the conversion of the energy of tides into usable energy, usually electricity
transition vault	Underground concrete transition vault that to be constructed at the landing site and inside of which offshore and shore South Fork Export Cable would be spliced together.
trawl	A large fishing net dragged by a vessel at the bottom or in the middle of sea or lake water
turbidity	A measure of water clarity
vibracore	Technology/technique for collecting core samples of underwater sediments and wetland soils
viewshed	Area visible from a specific location
visual resource	The visible physical features on a landscape, including natural elements such as topography, landforms, water, vegetation, and manmade structures
wetland	Land saturated with water; marshes; swamps
wind energy	Electricity from naturally occurring wind
wind energy area	Areas with significant wind energy potential and defined by BOEM
wind turbine generator	Component that puts out electricity in a structure that converts kinetic energy from wind into electricity

APPENDIX C

Incomplete or Unavailable Information

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Introduction

In accordance with Section 1502.21[1] of the Council on Environmental Quality regulations implementing the National Environmental Policy Act (NEPA), when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement (EIS) and there is incomplete or unavailable information, the agency shall make clear that such information is lacking.

Given the substantial geographic and temporal scale of the cumulative impacts analysis for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (Project), some information regarding ongoing activities is unavailable or only available in qualitative or summary form—in particular, for many offshore resources. Concerning reasonably foreseeable construction and operations plans (COPs), specific information is available only for COPs that have been submitted for Bureau of Ocean Energy Management (BOEM) review and are publicly available (see Appendix E of the EIS). Given that information is lacking for other offshore wind activities considered reasonably foreseeable, and several of the COPs submitted are currently under review to determine whether they contain complete and sufficient information for environmental review, a series of assumptions were necessary to conduct the cumulative impacts analysis as outlined in Appendix E3, Table E3-1. Although these assumptions were necessary to allow the analysis to proceed with a reasonable degree of certainty, it is not known whether or to what extent future offshore wind activities will proceed according to these assumptions.

In addition to the uncertainty regarding future activities contemplated in the cumulative analysis, there is also incomplete or unavailable information regarding the likely consequences of various activities on the resources analyzed. When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the assessment of impacts and essential to a reasoned choice among alternatives. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information and if the cost of obtaining it was unreasonable. If information could not be obtained within the time frame needed for this analysis or because of exorbitant costs, BOEM applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years and would therefore not be available within the contemplated time frame of this NEPA process. In its place, subject matter experts have used the scientifically credible information available and accepted scientific methodologies for proxy indicators or data to evaluate impacts on the resources while this information is unavailable.

Incomplete or Unavailable Information Analysis for Resource Areas

Air Quality

Any action alternative for the Project would lead to air quality impacts that range from **negligible** to **moderate** and **minor** beneficial. Although a quantitative emissions inventory analysis of the region over the next 35 years has not been completed, the EIS does disclose annual emissions that could have been avoided by using non–fossil fuel energy sources within the air quality geographic analysis area, as well as the health impacts from those avoided emissions. In addition, the differences among action alternatives

[1] 40 CFR 1502.22 in Council on Environmental Quality regulations implementing NEPA prior to September 14, 2020.

with respect to direct emissions due to construction and installation, operations and maintenance (O&M), and decommissioning of the Project would likely be small. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to the use of onshore and offshore portions of the air quality geographic analysis area. In summary, BOEM did not identify incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

Bats

Habitat use and distribution vary between season and species, and as a result, there will always be some level of incomplete information on the distribution and habitat use of migratory bats in the offshore portions of the bat geographic analysis area. In addition, because U.S. offshore wind is in its infancy, with three offshore wind projects (Block Island Wind Farm, Virginia Commercial Offshore Wind, and Vineyard Wind Farm) having been or currently being constructed at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the geographic analysis area. However, empirical data, including regional bat acoustic studies conducted from coastal, island, vessel, or offshore structure locations and regional telemetry data from recent studies focusing on listed species, were used to assess the likelihood of offshore occurrence, seasonal patterns, and bat species composition.

Information on collision risk to migratory bats is also available from observations collected at land-based U.S. wind facilities, and based on a number of assumptions regarding the applicability to offshore environments, this information was used to analyze and evaluate the potential for collisions associated with the wind turbine generators (WTGs) analyzed in the EIS. In addition, and as described in Section 3.5.1 of the EIS, the likelihood of an individual migratory bat encountering the rotor swept zone of one or more operating WTGs is negligible. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the distribution and use of the offshore portions of the geographic analysis area, as well as to the potential for collision risk of migratory bats. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable scientifically based information on bat resources that is essential to a reasoned choice among alternatives.

Benthic Habitat and Invertebrates

Although there is some uncertainty regarding the temporal distribution of benthic resources and periods during which they might be especially vulnerable to disturbance, site-specific benthic habitat mapping by Inspire Environmental (2020) and other broadscale studies (e.g., Fugro 2019, 2021; Guida et al. 2017; Stantec 2020) provided a suitable basis for predicting the species, community composition, and distributions of benthic resources in the geographic analysis area. Some uncertainty also exists about the effects of some impact-producing factors (IPFs) on benthic resources. For example, the available information on invertebrate sensitivity to electromagnetic fields (EMFs) is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for all species (e.g., squid sensitivity to vibration effects transmitted through sediments). However, information from monitoring studies of European wind facilities and, more recently, the Block Island Wind Farm in the United States provides no indication of biologically significant adverse effects. There is broader

uncertainty about the long-term effects of changes in biological productivity resulting from the creation of new habitat types on the mid-Atlantic Outer Continental Shelf (OCS) in the form of a distributed network of artificial reefs. The widespread development of offshore renewable energy facilities would, however, create a distributed network of artificial reefs on the mid-Atlantic OCS. These reefs form biological hotspots that could support species range shifts and expansions, nonnative species, and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). The nature and significance of secondary synergistic effects, such as changes in diet and predator-prey interactions resulting from habitat modification in combination with other IPFs, are not fully known. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as larval dispersal, are not fully understood (van Berkel et al. 2020).

As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision making because relevant studies monitoring changes at wind farms have not observed significant changes to finfish over years of study. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable information that is essential to a reasoned choice among alternatives. There is uncertainty regarding the spatial and temporal occurrence of invertebrates throughout the entire benthic habitat and invertebrates geographic analysis area. However, broadscale information is available from sources such as federal fisheries management plans (FMPs) and surveys completed to support COP submission. There is also uncertainty regarding behavioral effects from each IPF individually and cumulatively. Again, BOEM is able to draw on existing scientific findings, as presented in Section 3.6 of the EIS and references therein. The available information is suitable for characterizing the likely effects of each IPF and has been used to analyze potential impacts resulting from the proposed Project and past, present, and reasonably foreseeable actions. Therefore, BOEM concludes that the available information about potential impacts on benthic habitats supports a reasoned choice among alternatives.

Birds

Habitat use and distribution of birds vary between seasons, species, and years, and as a result, there will always be some level of incomplete information on the distribution and habitat use of birds in the offshore portions of the birds geographic analysis area. However, survey findings for the Project (see COP Appendix K [*Onshore Natural Resources and Biological Assessment*] [vhb 2021]) were used to inform the predictive models and analyze the potential adverse impacts on bird resources in the EIS. In addition, because U.S. offshore wind is in its infancy, as described above for bats, there will always be some level of uncertainty regarding the potential for collision risk and avoidance behaviors for some of the bird species that may be present within the offshore portions of the geographic analysis area.

Bird mortality data are available for onshore wind facilities, and based on a number of assumptions (described in Section 3.7 of the EIS) regarding their applicability to offshore environments, these data were used to inform the analysis of bird mortality associated with the offshore WTGs analyzed in the EIS. However, uncertainties exist regarding the use of the onshore bird mortality rate to estimate offshore bird mortality rate because of differences in species groups present, the life history and behavior of species, and

the differences in the offshore marine environment compared to onshore habitats. Similarly, the U.S. Fish and Wildlife Service biological assessment (BA) (BOEM 2022a) also provides an estimate of potential mortality using the Band (2012) collision risk model for Endangered Species Act species. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2022a). Because of inherent data limitations, these models often represent only a subset of species potentially present. However, the datasets used by both Revolution Wind, LLC (Revolution Wind), and BOEM to assess the potential for exposure of birds to offshore wind activities represent the best available data and provide context at both local and regional scales. Further, sufficient information on collision risk and avoidance behaviors observed in related species at European offshore wind projects is available and was used to analyze and corroborate the potential for these impacts as a result of the Project (e.g., Petersen et al. 2006; Skov et al. 2018). For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to distribution and use of the offshore portions of the analysis area, as well as to the potential for collision risk and avoidance behaviors in bird resources. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM did not identify incomplete or unavailable information on bird resources that is essential to a reasoned choice among alternatives.

Coastal Habitats and Fauna

Although the preferred areas of coastal habitats and associated fauna are generally known, exact abundances and distributions of various fauna are likely to remain unknown for the foreseeable future. However, the species inventories and other information from nearby areas provide an adequate basis for evaluating the fauna likely to inhabit the coastal habitat and fauna geographic analysis area. Additionally, the onshore activities proposed involve only common, industry-standard activities for which impacts are generally understood. For this reason, BOEM identified no incomplete or unavailable information required to conduct the impact assessment or to make a reasoned choice among alternatives.

Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and effects of environmental factors on fish populations. The fisheries information used in this assessment has limitations. For example, vessel trip report data are only an approximation because they are self-reported, and available historical data lack consistency, making comparisons challenging. However, these data do represent the best available data, and sufficient information exists to support the findings presented herein.

A second limitation is that aggregated geographic information system (GIS)–based data is necessary to fully update the revenue intensity figures. EIS Figures G-1 through G-13 in Appendix G provide low-resolution images of revenue intensity by FMP and provide graphic representations of the distribution of fishing efforts near the Lease Area for the years shown. However, similar revenue intensity figures are not available for ports or gear. Although the analysis in EIS Section 3.9 refers to these figures, annual vessel trip report data for 2008 to 2019 from the Greater Atlantic Regional Fisheries Office (GARFO) (2021) were the primary sources of data used in the tables throughout the assessment. These tables in EIS Section 3.9 summarize harvests and revenues by FMP, by ports, and by gears within the RWF and Revolution Wind Export Cable. Although additional revenue intensity figures would augment information provided

in the analysis, BOEM determined this information is not essential to a reasoned choice among alternatives.

Cultural Resources

Information pertaining to the identification of historic properties within certain portions of the marine archaeology area of potential effects will not be available until after the record of decision (ROD) is issued and the COP is approved. BOEM will prepare a ROD in consultation with the National Historic Preservation Act Section 106 consulting parties that will allow for deferred identification and evaluation of historic properties within the marine archaeology area of potential effects, facilitating that a good faith effort to identify historic properties and assess effects is fully performed prior to construction. The ROD will apply to the alternative(s) selected. Therefore, BOEM has not identified incomplete or unavailable information on cultural resources that is essential to a reasoned choice among alternatives.

Demographics, Employment, and Economics

Estimates of local employment and income resulting from development and construction of the Project may be underestimated because the broadly used model to project the employment impacts of offshore wind energy development—the Jobs and Economic Development Impact Offshore Wind Model (JEDI-OWM) developed by the National Renewable Energy Laboratory (NREL)—has not been updated to include recent developments within the U.S. offshore wind component manufacturing and fabrication industry, despite NREL's recent updates to capital cost estimation portions of the JEDI-OWM.[2]

The COP and COP appendices do provide estimates of a capital and operating cost of a single configuration of RWF (with 89 8-megawatt [MW] WTGs and a nameplate capacity of 712 MW) along with an estimate of economic impacts to the United States and local economies of Rhode Island and Connecticut based on the 2017 version of the JEDI-OWM. It is presumed that Revolution Wind provided specific guidance to their economic analysts with respect to technical and cost parameters, as well as United States and local spending coefficients for this assessment. However, most of the specific technical details of the assessment were not provided to BOEM or to the authors of the EIS. Therefore, estimates of economic impacts of the development and construction of RWF under the range of EIS alternatives rely heavily on the economic impacts developed in the COP relative to estimates of capital and operating costs of the single configuration provided.

Because Revolution Wind provided the baseline estimates of economic impacts of the Project, and because other information from NREL's updated JEDI-OWM model[2] provides current estimates of capital costs of offshore wind farms with WTGs ranging up to 15 MW, BOEM determined that the lack of directly provided information with respect to other configurations is not essential to a reasoned choice among alternatives.

[2] An updated version of JEDI-OWM was made available in 2021. The portions of the JEDI-OWM used to estimate capital operational costs have been updated and include cost estimates of large WTGs (12 MW and 15 MW) that are likely to be employed in future offshore windfarms. However, sections of the model that are used to estimate U.S. and local economic impacts have not yet been completed. The economic impact estimates used in the demographic, employment, and economics section of the EIS are augmented by improved capital cost estimates in the new release, but continue to employ U.S. and local spending patterns included in the 2017 version of the JEDI-OWM.

Environmental Justice

Evaluations of impacts on environmental justice communities rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities. However, BOEM has determined that the incomplete and unavailable resource information summarized in this appendix was either not relevant to a reasoned choice among alternatives or the alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the onshore and offshore portions of the environmental justice analysis area.

Finfish and Essential Fish Habitat

Monitoring studies of European and American offshore wind energy facilities to date (Hutchison et al. 2020; Raoux et al. 2017; Reubens et al. 2013, 2014) provide no indication of biologically significant adverse effects on finfish and their habitats. However, broader uncertainty remains about the long-term effects of changes in biological productivity resulting from the creation of new habitat types along the Atlantic OCS in the form of a distributed network of artificial reefs (Degraer et al. 2020). The nature and significance of potential ecological responses, such as changes in diet and predator-prey interactions resulting from changes in habitat productivity, are not fully known. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as seasonal stratification of the Cold Pool and larval dispersal patterns, are not fully understood (Johnson et al. 2021; van Berkel et al. 2020). Targeted modeling studies suggest that the effects of offshore wind development in the RI/MA and MA WEAs on water column stratification and larval dispersal patterns are unlikely to be ecologically significant (Johnson et al. 2021). However, this study considered only two out of several WEAs in the geographic analysis area, meaning that the potential effects resulting from full build-out of all WEAs within the geographic analysis area remain to be studied.

As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision making because relevant studies monitoring changes at wind farms have not observed significant changes in finfish abundance and distribution at regional scales over years of study. For example, while wind farm installation can displace soft-bottomed habitat in favor of hard substrates, the affected areas usually represent a small fraction of available habitat. Moreover, offshore wind structures provide habitat complexity that generally results in an increase in biological productivity, which in turn can attract fish species that associate with complex habitat types (Degraer et al. 2020). Therefore, while some uncertainty remains, the available information does not suggest that long-term negative effects are likely. The similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives.

There is uncertainty regarding the spatial and temporal occurrence of finfish and essential fish habitat (EFH) throughout the entire finfish and EFH geographic analysis area. This is especially true for Atlantic cod (*Gadus morhua*) use of the Coxes Ledge area, which is part of an ongoing study funded by BOEM

examining the movements of commercial fish species in southern New England (National Oceanic and Atmospheric Administration [NOAA] 2020a). However, broadscale information is available from sources such as federal FMPs and from surveys completed to support COP submission. There is also uncertainty regarding behavioral effects from each IPF individually and cumulatively (e.g., operational noise effects on Atlantic cod communication during spawning). Again, BOEM is able to draw on existing scientific findings, as presented in Section 3.13 of the EIS and references therein, in the RWF EFH assessment (BOEM 2022c), and in the National Marine Fisheries Service (NMFS) BA (BOEM 2022b). The available information is suitable for characterizing the likely effects of each IPF and has been used to analyze potential impacts resulting from the Project and past, present, and reasonably foreseeable actions. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM concluded that the available information about potential impacts on finfish and EFH supports a reasoned choice among alternatives.

Land Use and Coastal Infrastructure

There is no incomplete or unavailable information related to the analysis of impacts on land use and coastal infrastructure.

Marine Mammals

Although there is some uncertainty regarding the temporal distribution of marine mammals and periods during which they might be especially vulnerable to Project disturbance, the NMFS BA (BOEM 2022b) provides detailed species descriptions and life history information. NOAA has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2019 and 2020 stock status reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021). These studies provide a suitable basis for predicting the species, abundances, and distributions of marine mammals in the geographic analysis area.

Uncertainty also exists with regard to the effects of some IPFs on marine mammals. For example, there is still some uncertainty regarding the impacts on marine mammals from EMF produced by submarine cables. This uncertainty is due in part to difficulties in evaluating population-scale impacts around regional deployments (Taormina et al. 2018), to the large size and high mobility of marine mammals, and to other logistical constraints, which make experimental studies infeasible. As a result, no scientific studies have been conducted to examine the effects of altered EMF on marine mammals. Although scientific studies summarized by Normandeau Associates, Inc., et al. (2011) demonstrate that marine mammals are sensitive to and can detect small changes in magnetic fields, as described in Section 3.15 of the EIS, those potentially detectable impacts would only occur within a few feet of select cable segments. There is no basis to conclude that the potential detection of EMFs would lead to any measurable change in behavior. For this reason, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area.

Some uncertainty also exists regarding the cumulative acoustic impacts associated with pile-driving activities. The available information relative to impacts on marine mammals from pile driving associated

with offshore wind development is primarily limited to information on harbor porpoise (*Phocoena phocoena*) and harbor seal (*Phoca vitulina*) because most of this research has occurred at European offshore wind projects, where large whales are uncommon. At this time, it is unclear if marine mammals would cease feeding and when individuals would resume normal feeding, migrating, breeding, etc., behaviors once daily pile-driving activities cease, or if secondary indirect impacts would persist. Under the cumulative impact scenario, individual whales may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over multiple days. The consequences of these exposure scenarios have been analyzed with the best available information, but a lack of real-world observations on species' responses to pile-driving results is uncertain. Additionally, it is currently unclear how sequential years of construction of multiple projects would impact marine mammals. Future projects will undergo a project-specific analysis under NEPA, the Endangered Species Act, and the Marine Mammal Protection Act that may reach different impact conclusions from this analysis if warranted based on new scientific and potentially observable information, or if impacts are defined differently from the EIS.

There is also uncertainty about certain potential impacts on marine mammals resulting from the long-term presence of offshore wind structures in the environment. For example, operational WTGs would generate low-frequency underwater noise that may exceed the established minimum threshold for potential behavioral and auditory masking impacts within a short distance (e.g., approximately 120 feet) from each foundation, although detectable noise above ambient levels could extend up to 560 feet or more. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. However, the 120 root mean square decibels (dB_{RMS}) threshold may not adequately represent the potential for adverse effects of chronic noise exposure (e.g., Cholewiak et al. 2018; Hatch et al. 2012; Jensen et al. 2009; Putland et al. 2017). The implications of long-term operational noise impacts and structure presence on marine mammal behavior, particularly the behavior of large whale species, are unclear. These potential impacts are topics of ongoing research.

There is broader uncertainty about how large whales will respond to the presence of extensive networks of novel offshore wind structures on the Atlantic OCS. Under the cumulative impact scenario, up to 3,110 new structures (i.e., WTGs and OSSs) could be constructed across the geographic analysis area. Although the planned spacing of structures would not obstruct whale movement between structures, the potential synergistic effects of structure presence and low-level operational noise are uncertain. There is also some uncertainty around reef effect and hydrodynamic impacts on prey and forage availability and predator-prey interactions. Additionally, these impacts could combine and interact with ongoing changes in marine species distribution and community composition driven by climate change. Displacement effects that result in increased interactions between vulnerable populations of marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. The potential consequences of these impacts on the Atlantic OCS are unknown. Monitoring studies could be able to track these changes and observe how they may influence whale behavior. At present, BOEM has no basis to conclude that these IPFs would result in significant adverse impacts on any marine mammal species.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms potentially impacting the distribution of

larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the geographic analysis area.

BOEM determined that the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or that the means to obtain it are not known. Therefore, BOEM extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.15 of the EIS and in the BA submitted to NMFS (BOEM 2022b). As a result, the information and methods used to predict potential impacts on marine mammals represent the best available information, and the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the geographic analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM has not identified incomplete or unavailable scientific information on marine mammal resources that is essential to a reasoned choice among alternatives.

Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the EIS is based on automatic identification system (AIS) data for calendar year 2019. Vessel monitoring system (VMS) data for fishing vessels provided by the NMFS were the basis for polar histograms and other analytical outputs used in evaluating commercial and for-hire recreational fishing trips (see EIS Section 3.9). Some smaller recreational and fishing vessels carry an AIS; however, the AIS analysis likely excludes most vessels less than 65 feet (19.8 meters) long that traverse the WEA. In addition, as discussed under Commercial Fisheries and For-Hire Recreational Fishing, above, the VMS data provided by NMFS indicate the number of vessels in each fishery and their direction of travel while actively fishing, which speaks to alignment of the WTG grid. Nonetheless, the combination of AIS and VMS data described above represent the best available vessel traffic data and are sufficient to enable BOEM to make a reasoned choice among alternatives.

The U.S. Coast Guard's (USCG's) final report for the Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (MARIPARS), evaluating the need for establishing vessel routing measures, was published in the *Federal Register* on May 27, 2020 (USCG 2020). The MARIPARS report recommends a standard and uniform grid pattern turbine layout throughout the Rhode Island and Massachusetts Lease Areas as the best way to facilitate predictable safe navigation throughout the contiguous leases. The five Rhode Island and Massachusetts offshore wind leaseholders, including Revolution Wind, have proposed a collaborative regional layout for wind turbines (1 × 1 nm apart in fixed east–west rows and north–south columns, with 0.7-nm theoretical transit lanes oriented northwest–southeast) across their respective BOEM leases (Geijerstam et al. 2019), which meets the layout rules set forth in the MARIPARS report recommendations. Although the USCG attached to the MARIPARS *Federal Register* docket the Responsible Offshore Development Alliance proposal (Hawkins 2020), which recommends additional transit corridors through the Lease Areas, the MARIPARS report concludes that if the layout in the recommendations was implemented, the USCG would likely not pursue additional formal or informal routing measures. As a cooperating agency with BOEM, the USCG would continue to consult over the course of the NEPA process for the Project as it relates to navigational safety and other aspects, including the impacts associated with alternatives assessed. Therefore, BOEM has not identified incomplete or

unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives.

Other Uses

In the context of this EIS, other uses includes aviation and air traffic, land-based radar, marine mineral resources and dredged material disposal, military and national security, offshore energy (aside from the proposed Project), scientific research and surveys, and undersea cables. There is no incomplete or unavailable information related to the analysis of marine mineral resources and dredged material disposal, military and national security, aviation and air traffic, offshore energy (aside from the aspects described in this appendix for the proposed Project, and the reasonably foreseeable offshore wind projects for which BOEM has not received COPs), undersea cables, and land-based radar uses.

As discussed in Section 3.17 of the EIS for scientific research and surveys, analysis in the EIS discloses both Project-specific and cumulative impacts to NMFS's ability to continue conducting scientific research and surveys for the purpose of fisheries management and protected species management. Despite the foregoing, BOEM has concluded that the information provided by NOAA in Section 3.17 regarding scientific research and surveys is sufficient to support the impact findings presented in the EIS. Therefore, BOEM has not identified incomplete or unavailable information on scientific research and surveys that is essential to a reasoned choice among alternatives.

Recreation and Tourism

There is a lack of quantitative data related to recreational not-for-hire fishing in the recreation and tourism geographic analysis area; therefore, quantitative analysis for this resource is not possible at this time. BOEM is considering how best to approach this issue for future similar projects. *Fisheries Economics of the United States 2018* (NMFS 2021) is a comprehensive summary document and the data presented discuss the overall economic level for not-for-hire recreational anglers in the offshore New England region (Maine, New Hampshire, Rhode Island, Connecticut, and Massachusetts). However, the document does not relate to how projects such as the RWF are likely to affect not-for-hire recreational fishing and is not detailed enough in geographic extent to discuss specific recreational angling locations.

However, BOEM has determined that incomplete and unavailable resource information was either not relevant to a reasoned choice among alternatives or alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the onshore and offshore portions of the geographic analysis area.

Sea Turtles

Sea turtles are difficult to observe in the open ocean, and there is some uncertainty about the distribution of some turtle species (e.g., the green sea turtle [*Chelonia mydas*]) in relation to the Lease Area. The NMFS BA (BOEM 2022b) provides a thorough overview of the available information about potential species occurrence and exposure to Project-related IPFs. The studies summarized therein provide a suitable basis for predicting potential species occurrence, relative abundance, and probable distribution of sea turtles in the geographic analysis area.

Some uncertainty exists about the effects of certain IPFs on sea turtles and their habitats. For example, sea turtle sensitivity to potential EMF effects from the Project is not fully understood. Sea turtles are known to use the earth's magnetic field to orient in space and navigate between habitats (Irwin and Lohmann 2005; Courtillot et al. 1997). However, the available research has not examined how sea turtles respond to lower strength EMF levels on the order of those likely to result from the Project. Although there are no direct data on impacts on sea turtles from EMFs generated by underwater cables, the preponderance of evidence summarized in the BOEM-sponsored report by Normandeau et al. (2011) indicates that sea turtles are unlikely to detect most of the EMF impacts resulting from the Project. Potentially detectable EMF effects would be limited to within 5 feet of the short segments of cable laid on the seafloor that are not buried. Section 3.19 of the EIS and the NMFS BA (BOEM 2022b) allowed BOEM's subject matter experts to estimate the potential risk to other species of sea turtles based on the assumption of similar anatomical, behavioral, and life history similarities, related to EMFs. Although the thresholds for EMF disturbance to the behavior of all potential species of sea turtles are not known, no adverse effects on sea turtles from the numerous submarine power cables around the world have been documented, and modeling of the anticipated EMFs generated by Project components suggests the majority of induced field strengths would likely be below detection levels. Similar to marine mammals, data are also not available to evaluate potential changes to normal movements of juvenile and adult sea turtles due to short-term elevated suspended sediments. Although some exposure may occur, total suspended sediment impacts would be limited in magnitude and duration and within the range of natural exposures periodically experienced by these species. On this basis, any resulting impact on behavior would likely be too small to be biologically meaningful, and no adverse impacts would be expected (NOAA 2020b).

There is also uncertainty relative to sea turtle responses to construction activities on the Atlantic OCS. Some potential for displacement from areas exposed to noise and disturbance exists. However, should any displacement of individuals occur, it is unclear if this would result in adverse impacts (e.g., because of lost foraging opportunities or increased exposure to potentially fatal vessel interactions). Additionally, it is currently unclear whether concurrent construction of multiple projects, increasing the extent and intensity of impacts over a shorter duration or spreading out project construction, and associated impacts over multiple years would result in the least potential harm to sea turtles. There is also uncertainty regarding the cumulative acoustic impacts associated with pile-driving activities. At this time, it is unclear if sea turtles that have ceased feeding during multiple construction activities would resume normal feeding, migrating, breeding, etc., behaviors once daily pile-driving activities cease or if secondary indirect impacts would continue. Under the cumulative impact scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over the course of multiple days. The consequences of these exposure scenarios have been analyzed with the best available scientific information in Section 3.19 of the EIS, although some level of uncertainty remains due to the lack of observational data on species responses to pile driving. In addition, modeled predictions of operational sound for large turbines (10 MW) indicate that the sound levels could be greater than observed for existing wind turbines; actual sound levels are still predicted to be well below levels that could potentially cause harm.

Some uncertainty exists in regard to the potential for sea turtle responses to Federal Aviation Administration hazard lights and navigation lighting associated with offshore wind development. Given the placement of the new structures far from nesting beaches and within the OCS, no impacts to nesting female or hatchling sea turtles would be expected. Revolution Wind has incorporated BOEM's guidance

(BOEM 2021; Orr et al. 2013) for avoiding and minimizing artificial lighting impacts on aquatic life into the Project design. This environmental protection measure would limit WTG and electrical service platform lighting to minimum levels required by regulation for worker safety, navigation, and aviation. Sea turtle sensitivity to these minimal light levels is unknown. However, given that sea turtles do not appear to be adversely affected by oil and gas platform operations, which produce far more artificial light than offshore wind structures (BOEM 2022b), this IPF is not expected to have any measurable impacts (adverse or beneficial) on sea turtles in the offshore environment.

More broadly, considerable uncertainty remains about how sea turtles would interact with the long-term changes in biological productivity and community structure resulting from the development of an extensive network of artificial reefs across the geographic analysis area. Artificial reef and hydrodynamic impacts could influence predator-prey interactions and foraging opportunities in ways that influence sea turtle behavior and distribution. These IPFs are expected to interact with the ongoing influence of climate change on species distribution and behavior over broad spatial scales, but the nature and significance of these interactions are unclear. BOEM anticipates that ongoing monitoring of offshore energy structures will provide some useful insights into these synergistic effects. BOEM considered the level of effort required to address the uncertainties described above for sea turtles and determined that the methods necessary to do so are lacking and/or the associated costs would be exorbitant. Where appropriate, BOEM inferred conclusions about the likelihood of potential biologically significant impacts from available information for similar species and/or situations. These methods are described in greater detail in Section 3.19 of the EIS and in the BA submitted to NMFS (BOEM 2022b). The approaches and methods used are based on the best available scientific information, and the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision making related to the proposed uses of the offshore portions of the analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on sea turtle resources that is essential to a reasoned choice among alternatives.

Visual Resources

There is no incomplete or unavailable information related to the analysis of impacts on visual resources.

Water Quality

There is no incomplete or unavailable information related to the analysis of impacts on water quality.

Wetlands and Other Waters of the United States

There is no incomplete or unavailable information related to the analysis of impacts on wetlands and other waters of the United States.

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APPENDIX D

Project Design Envelope and Maximum-Case Scenario

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Table D-1. Maximum-Case Scenario List of Parameter Specifications D-1

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Introduction

This environmental impact statement (EIS) assesses the impacts of the reasonable range of Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project) designs that are described in the Revolution Wind construction and operations plan (COP) by using the maximum-case scenario process. The maximum-case scenario analyzes the aspects of each design parameter that would result in the greatest impact for each physical, biological, and socioeconomic resource. This EIS considers the interrelationship among aspects of the project design envelope (PDE) rather than simply viewing each design parameter independently. Additional information and guidance related to the PDE concept can be found in Chapter 1 of the EIS and on BOEM's website available at https://www.boem.gov/Draft-Design-Envelope-Guidance/. Table D-1 details the full range of maximum-case design parameters for the proposed Project and which parameters are relevant to the analysis for each EIS resource section (denoted with an *X*) in Chapter 3 of the EIS.

Table D-1. Maximum-Case Scenario List of Parameter Specifications

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
WIND FARM																					
Wind farm capacity	704 megawatt (MW)	880 MW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WIND TURBINE GENERATOR (WTG) AND MONOPILE FOUNDATION																					
Turbine size	8 MW	12 MW	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Number of WTG positions	59	100	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Distance between positions	1 nautical mile (nm) between WTGs on an east–west, north–south grid	1 nm between WTGs along north–south rows, and 0.7 mile between WTGs within east–west rows	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Total tip height	647.6 feet (197.4 meters [m])	872.7 feet (266 m)		X		X		X	X						X	X	X		X		
Hub height	377 feet (115 m)	512 feet (156 m)		X		X		X	X						X	X	X		X		
Turbine height	646 feet (197 m)	873 feet (266 m)		X		X		X	X						X	X	X		X		
Rotor diameter	538 feet (164 m)	722 feet (220 m)		X		X		X	X						X	X	X		X		
Base height (foundation height–top of transition piece)	19.7 feet (6 m)	26 feet (8 m)		X		X		X	X						X	X	X		X		
Base (tower) width (at the top)	13 feet (4 m)	21 feet (6.4 m)		X		X		X	X						X	X	X		X		

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Nacelle dimensions (length × width × height)	46 × 23 × 20 feet (14 × 7 × 6 m)	72 × 33 × 39 feet (22 × 10 × 12 m)		X		X		X	X						X	X	X		X		
Rotor swept zone area	5.2 acres (21,100 square meters [m^2])*	9.7 acres (39,400 m^2)*		X		X		X	X						X	X	X		X		
Blade length	259 feet (79 m)	351 feet (107 m)		X		X		X	X						X	X	X		X		
Blade width	16 feet (5 m)	26 feet (8 m)		X		X		X	X						X	X	X		X		
Base height (foundation height–top of transition piece)	82 feet (25 m)	128 feet (39 m)		X		X		X	X						X	X	X		X		
Air gap (mean sea level to bottom of blade tip)	93.5 feet (28.5 m)	151 feet (46 m)		X		X		X	X						X	X	X		X		
Foundation construction method	Pile driving	Pile driving	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Foundation and WTG vessel type	Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges	Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Jack-up vessel seabed penetration of spudcans (WTG and OSS)	52 feet	52 feet	X		X			X	X			X		X	X	X	X	X	X	X	
Jack-up radius around foundations (WTG and OSS)	656 feet	656 feet	X		X			X	X			X		X	X	X	X	X	X	X	
Jack-up seabed preparation (WTG and OSS)	18.36 acres (assume all foundations need one jack up; 0.18 acre per jack up x 102 foundations = 18.36 acres)	21.14 acres (assume 15% of all foundations will need one additional jack up; 18.36 acres + 0.18*(0.15 x 102) = 21.14 acres)	X		X			X	X			X		X	X	X	X	X	X	X	
WTG coloring	RAL 9010 Pure White	RAL 7035 Light Grey				X			X						X	X	X		X		

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Bureau of Ocean Energy Management (BOEM) aviation and navigation safety recommendations (BOEM 2021)	Two synchronized L-864 aviation medium-intensity red flashing obstruction lights mounted on the WTG nacelle at a height of approximately 530 feet (161.5 m); up to three L-810 low-intensity red flashing obstruction lights mounted on the WTG tower midsection at a height of approximately 312 feet (95 m); all lights would synchronize with 30 flashes per minute for air navigation lighting	Two synchronized L-864 aviation medium-intensity red flashing obstruction lights mounted on the WTG nacelle at a height of approximately 530 feet (161.5 m); up to three L-810 low-intensity red flashing obstruction lights mounted on the WTG tower midsection at a height of approximately 312 feet (95 m); all lights would synchronize with 30 flashes per minute for air navigation lighting		X		X		X	X						X	X	X		X		
BOEM aviation and navigation safety recommendations (BOEM 2021); U.S. Coast Guard (USCG) District 1 offshore structure marking guidance (USCG 2020a)	Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above mean lower low water on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm	Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above mean lower low water on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm		X		X		X	X						X	X	X		X		
BOEM aviation and navigation safety recommendations; USCG District 1 offshore structure Private Aids to Navigation (PATON) marking guidance (USCG 2020b)	Flashing white light visible to 1 nm for Class C structure (to be determined by USCG)	Flashing white light visible to 5 nm for Class A structure (to be determined by USCG)		X		X		X	X						X	X	X		X		
WTG foundation coloring	RAL 1023 Yellow from water line to height of at least approximately 50 feet	RAL 1023 Yellow from water line to height of at least approximately 50 feet		X		X		X	X						X	X	X		X		
Nautical hazard prevention device	Foghorns audible to 2 nm and emit 134 decibels at 3 feet (1 m) and a tone at a frequency of 660 hertz (Hz)	Foghorns audible to 2 nm and emit 134 decibels at 3 feet (1 m) and a tone at a frequency of 660 Hz		X	X	X		X				X		X	X	X	X				

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Number of monopile foundations	61	102	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Monopile diameter	20–39 feet (tapered)	20–39 feet (tapered)	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Number of piles per foundation	1	1	X		X			X	X			X		X	X	X	X	X	X	X	
Seabed disturbance—no scour protection—per monopile foundation	0.027 acre	0.027 acre	X		X			X	X			X		X	X	X	X	X	X	X	
Monopole and scour protection area per foundation	0.7 acre	0.7 acre	X		X			X	X			X		X	X	X	X	X	X	X	
Seabed preparation per foundation	7.2 acres	7.2 acres	X		X			X	X			X		X	X	X	X	X	X	X	
Vessel anchoring/mooring per foundation	Not provided	Not provided	X		X			X	X			X		X	X	X	X	X	X	X	
Hammer size for monopile foundation	4,000 kilojoules (kJ)	4,000 kJ	X		X			X	X			X		X	X	X	X	X	X	X	
Maximum penetration depth into seabed	98 feet (monopile)	164 feet (monopile)	X		X			X	X			X		X	X	X	X	X	X	X	
Duration of pile driving (hours/pile)	1–4 hours	6–12 hours	X		X			X	X			X		X	X	X	X	X	X	X	
Duration of installation (per WTG)	36 hours	36 hours	X		X			X	X			X		X	X	X	X	X	X	X	
Duration of installation (foundations/day)	3	3	X		X			X	X			X		X	X	X	X	X	X	X	
Period of all WTG foundation pile driving	5 months	5 months	X		X			X	X			X		X	X	X	X	X	X	X	

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
OFFSHORE SUBSTATION (OSS)																					
Number of OSSs	1	2	X	X	X	X		X	X			X		X	X	X	X	X	X	X	
Period of installation and commissioning	8 months	8 months	X		X			X	X			X		X	X	X	X	X	X	X	
OSS height, excluding lighting protection	82 + 108 feet = 190 feet	190 feet		X		X		X	X						X	X	X		X		
OSS height, including lighting protection	82 + 180 feet = 262 feet	262 feet		X		X		X	X						X	X	X		X		
Topside length and width	321.5 × 216.5 feet	321.5 × 216.5 feet		X		X		X	X						X	X	X		X		
USCG lighting	See monopile turbine requirements	See monopile turbine requirements		X		X		X	X						X	X	X		X		
OSS number of piles per foundation	1	1	X		X			X	X			X		X	X	X	X	X	X	X	
Scour protection area (per monopile)	0.7 acre	0.7 acre	X		X			X	X			X		X	X	X	X	X	X	X	
Seabed preparation per foundation	7.2 acres	7.2 acres	X		X			X	X			X		X	X	X	X	X	X	X	
OSS foundation construction method	Pile driving	Pile driving	X		X			X	X			X		X	X	X	X	X	X	X	
Diameter (minimum top to maximum bottom)	20–49 feet (tapered)	20–49 feet (tapered)	X		X			X	X			X		X	X	X	X	X	X	X	
Maximum hydraulic hammer energy	4,000 kJ	4,000 kJ	X		X			X	X			X		X	X	X	X	X	X	X	
INTER-ARRAY CABLE (IAC)																					
IAC capacity	72 kilovolts (kV)	72 kV	X		X			X	X			X		X	X	X	X	X		X	
IAC diameter	8 inches	8 inches																			
IAC length	155 miles	155 miles	X		X			X	X			X		X	X	X	X	X		X	

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Maximum disturbance depth	10 feet	10 feet	X		X			X	X			X		X	X	X	X	X		X	
Target burial depth	4 feet	6 feet	X		X			X	X			X		X	X	X	X	X		X	
Disturbance corridor-cable only (width)	131 feet	131 feet	X		X			X	X			X		X	X	X	X	X		X	
Period of installation of the complete IAC system	5 months	5 months	X		X			X	X			X		X	X	X	X	X		X	
IAC installation rate	400 m/hour	400 m/hour	X		X			X	X			X		X	X	X	X	X		X	
IAC general disturbance corridor	2,471 acres	2,471 acres	X		X			X	X			X		X	X	X	X	X		X	
IAC seabed disturbance due to boulder clearance (80% of total length)	1,976.8 acres	1,976.8 acres	X		X			X	X			X		X	X	X	X	X		X	
IAC seabed disturbance due to sandwave leveling/ dredging (10% of total length)	247.1 acres	247.1 acres	X		X			X	X			X		X	X	X	X	X		X	
IAC secondary cable protection (10% of total length)	74.1 acres	74.1 acres	X		X			X	X			X		X	X	X	X	X		X	
OFFSHORE SUBSTATION-LINK CABLE (OSS-LINK CABLE)																					
OSS-link cable capacity	275 kV	275 kV	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable length	9 miles	9 miles	X		X			X	X			X		X	X	X	X	X		X	
Number of OSS-link cables	1	1	X		X			X	X			X		X	X	X	X	X		X	
Cable diameter	11.8 inches	11.8 inches	X		X			X	X			X		X	X	X	X	X		X	

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Target burial depth	4 feet	6 feet	X		X			X	X			X		X	X	X	X	X		X	
Disturbance corridor (width)	131 feet	131 feet	X		X			X	X			X		X	X	X	X	X		X	
Maximum disturbance depth	10 feet	10 feet	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable installation rate	400 m/hour	400 m/hour	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable general disturbance corridor	148.0 acres	148.0 acres	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable seabed disturbance due to boulder clearance (60% of total length)	89 acres	89 acres	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable seabed disturbance due to sandwave leveling/ dredging (10% of total length)	14.8 acres	14.8 acres	X		X			X	X			X		X	X	X	X	X		X	
OSS-link cable protection (10% of total length)	4.4 acres	4.4 acres	X		X			X	X			X		X	X	X	X	X		X	
SUMMARY OF RWEC SEGMENT LENGTHS OFFSHORE																					
RWEC: OCS	Up to 19 miles (per cable)		X	X		X			X	X			X		X	X	X	X	X		X
RWEC: Rhode Island	23 miles (per cable)		X	X		X			X	X			X		X	X	X	X	X		X
Total RWEC segment lengths offshore	Approximately 42 miles (per cable)		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
RWEC OFFSHORE																					
RWEC capacity	275 kV	275 kV	X		X			X	X			X		X	X	X	X	X		X	
Number of RWECs	1	2	X		X			X	X			X		X	X	X	X	X		X	
RWEC diameter	11.8 inches	11.8 inches	X		X			X	X			X		X	X	X	X	X		X	
Disturbance corridor (width)	131 feet, up to 673 feet at joint locations	131 feet, up to 673 feet at joint locations	X		X			X	X			X		X	X	X	X	X		X	
Operational right-of-way (ROW)	1,640 feet	1,640 feet	X		X			X	X			X		X	X	X	X	X		X	
Target burial depth (offshore)	4 feet	6 feet	X		X			X	X			X		X	X	X	X	X		X	
RWEC installation rate	400 m/hour	400 m/hour	X		X			X	X			X		X	X	X	X	X		X	
Period of installation	8 months	8 months	X		X			X	X			X		X	X	X	X	X		X	
RWEC: trench width	up to 43 feet	up to 43 feet	X		X			X	X			X		X	X	X	X	X		X	
RWEC: Outer Continental Shelf (OCS) submarine cable general disturbance corridor	593.1 acres	593.1 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: OCS boulder clearance (40% of route, included in general disturbance corridor amount)	237.2 acres	237.2 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: OCS sandwave leveling (45% of route, included in general disturbance corridor amount)	266.9 acres	266.9 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: OCS cable protection (10% of route for each cable)	17.8 acres	17.8 acres	X		X			X	X			X		X	X	X	X	X		X	

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
RWEC: OCS cable omega joints (two total)	20.4 acre	20.4 acre	X		X			X	X			X		X	X	X	X	X		X	
RWEC: cable protection per crossing (with existing submarine assets)	20.8 acres	20.8 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: Rhode Island (RI) submarine cable general disturbance corridor	731.4 acres	731.4 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: RI boulder clearance (70% of route, included in general disturbance corridor amount)	512 acres	512 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: RI sandwave leveling (7% of route, included in general disturbance corridor amount)	51.2 acres	51.2 acres	X		X			X	X			X		X	X	X	X	X		X	
RWEC: RI cable protection (10% of route for each cable)	21.9 acres	21.9 acres	X		X			X	X			X		X	X	X	X	X		X	
Vessel anchoring corridor	1,640 feet	1,640 feet																			

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
RWEC AT LANDFALL																					
Landfall work area	3.1 acres	3.1 acres	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Transition join bays (located within the landfall work area)	1,340 square feet	1,340 square feet	X				X		X				X				X			X	X
Temporary cofferdam exit pits (2X) for horizontal directional drilling (HDD) construction (located within landfall work area)	0.24 acre	0.94 acre	X				X		X				X				X			X	X
ONSHORE TRANSMISSION CABLE AND PROJECT COMPONENTS																					
Landfall sites	Multiple landfall sites are currently being evaluated within the approximate 20-acre landfall envelope, located at Quonset Point in North Kingstown, Rhode Island.		X	X	X		X	X		X	X	X		X				X		X	X
Landfall work area	3.1 acres within the landfall envelope, located at Quonset Point in North Kingstown, Rhode Island		X	X	X		X	X		X	X	X		X				X		X	X
Landfall transition method	HDD with possible cofferdam		X	X	X		X	X		X	X	X		X				X		X	X
Temporary anchor wall driven depth	20 feet		X	X	X		X	X		X	X	X		X				X		X	X
HDD cable duct diameter	3 feet		X	X	X		X	X		X	X	X		X				X		X	X
HDD cable duct length	0.6 mile		X	X	X		X	X		X	X	X		X				X		X	X

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Landfall transition	Underground concrete transition vault		X	X	X		X	X		X	X	X		X				X		X	X
Onshore construction location	Single thermal concrete duct bank and splice vaults		X	X	X		X	X		X	X	X		X				X		X	X
Onshore construction method	Open trench (8-foot-wide trench within 25-foot-wide temporary disturbance corridor that expands to 30 × 75 feet at splice vaults) with HDD or other trenchless technology as needed		X	X	X		X	X		X	X	X		X				X		X	X
Onshore cable route	Landfall work area to The Narragansett Electric Company d/b/a National Grid (TNEC) Davisville Substation		X	X	X		X	X		X	X	X		X				X		X	X
Transition joint bays	67 × 10 × 10 feet																				
Onshore transmission cable corridor length	Approximately 1 mile		X	X	X		X	X		X	X	X		X				X		X	X
Onshore interconnection facility location	Immediately adjacent to the existing Davisville Substation in North Kingstown, Rhode Island		X	X	X		X	X		X	X	X		X				X		X	X
Length of underground ROW connecting the onshore substation (OnSS) to the interconnection facility	527 feet		X	X	X		X	X		X	X	X		X				X		X	X
Length of overhead ROW connecting the interconnection facility to the Davisville Substation	474 feet		X	X	X		X	X		X	X	X		X				X		X	X

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Onshore interconnection facility limit of work size	4 acres		X	X	X		X	X		X	X	X		X				X		X	X
OnSS (property size)	15 acres		X	X	X		X	X		X	X	X		X				X		X	X
OPERATIONS AND MAINTENANCE (O&M) FACILITY																					
Port of Montauk	A new building with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk.	A new building with up to 1,000 square feet) of office space and up to 6,000 square feet of equipment storage space would be constructed at the Port of Montauk.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Port of Davisville at Quonset Point	A new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point.	A new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space would be constructed at the Port of Davisville at Quonset Point.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Port of Brooklyn	There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port is assumed to be limited to existing facilities maintained by the port.	There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Brooklyn, and use of this port is assumed to be limited to existing facilities maintained by the port.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Port of Galilee	There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Galilee, and use of this port is assumed to be limited to existing facilities maintained by the port.	There are no plans to establish an O&M building at, or otherwise implement improvements to, the Port of Galilee, and use of this port is assumed to be limited to existing facilities maintained by the port.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Design Parameter	Minimum Design Size	Maximum Design Size	3.4 Air Quality	3.5 Bats	3.6 Benthic Habitat and Invertebrates	3.7 Birds	3.8 Coastal Habitats and Fauna	3.9 Commercial Fisheries and For-Hire Recreational Fishing	3.10 Cultural Resources	3.11 Demographics, Employment, and Economics	3.12 Environmental Justice	3.13 Finfish and Essential Fish Habitat	3.14 Land Use and Coastal Infrastructure	3.15 Marine Mammals	3.16 Navigation and Vessel Traffic	3.17 Other Uses	3.18 Recreation and Tourism	3.19 Sea Turtles	3.20 Visual Resources	3.21 Water Quality	3.22 Wetlands and Other Waters of the United States
Port Jefferson	An existing upland building within an office park located approximately 6 miles from Port Jefferson. This building would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. The building was recently purchased by Northeast Offshore, LLC, and has internal upgrades planned to establish office and warehouse space.	An existing upland building within an office park located approximately 6 miles from Port Jefferson. This building would serve as a regional O&M hub and headquarters for Orsted and multiple offshore wind projects. The building was recently purchased by Northeast Offshore, LLC, and has internal upgrades planned to establish office and warehouse space.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes: In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as miles, whereas nautical miles are referred to by name or by their abbreviation “nm.” Numbers that were calculated are rounded to the closest whole number.
* This value was calculated based on information provided.

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APPENDIX E

Planned Activities Scenario and Reasonably Foreseeable Future Activities and Projects

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Planned Activities Scenario

The impacts resultant from the planned activities scenario are the incremental effects of the Proposed Action on the environment added to other reasonably foreseeable planned actions in the area (40 Code of Federal Regulations [CFR] 1502.15). This appendix discusses resource-specific planned activities that could occur if Project impacts occur in the same location and time frame as impacts from other reasonably foreseeable planned actions. The *Project* here is the construction, operations and maintenance (O&M), and decommissioning of a wind energy project located within the Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0486, approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island and approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island.

BOEM anticipates that impacts could occur between the start of Project construction in 2023 and the completion of Project decommissioning which would occur within two years of the end of the lease (up to 35 years post-construction). The geographic analysis area (GAA) is defined by the impact-producing factor with the maximum geographic area of impact, for example sound during pile driving. For the mobile resources, bats, birds, finfish and invertebrates, marine mammals, and sea turtles, the species potentially impacted are those that occur within the area of impact of the Proposed Action. The GAA for these mobile resources is the general range of the species. The purpose of these analysis areas is to capture the impacts from planned activities to each of those resources potentially impacted by the Proposed Action. The GAA for each resource area is defined in the resource area sections of the EIS.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nautical miles are referred to by name or abbreviation *nm*.

Reasonably Foreseeable Future Activities and Projects

This section includes a list and description of other reasonably foreseeable activities that could contribute to cumulative impacts within the defined GAA for each resource category. Projects or actions that are considered speculative per the definition provided in 43 CFR 46.30[1] are noted in subsequent tables but excluded from the planned activities impact analysis in Chapter 3.

Planned (cumulative) activities described in this section consist of 10 types of actions: 1) other offshore wind energy development activities; 2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); 3) tidal energy projects; 4) marine minerals use and ocean-dredged material disposal; 5) military use; 6) marine transportation; 7) fisheries use and management; 8) global climate change; 9) oil and gas activities; and 10) onshore development activities.

[1] 43 CFR 46.30 – Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a responsible official of ordinary prudence would take such activities into account in reaching a decision. The federal and non-federal activities that BOEM must take into account in the analysis of cumulative impacts include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by BOEM. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

BOEM analyzed the possible extent of future other offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Table E-1 represents the status of projects as of January 1, 2022. The methodology for developing the scenario is largely the same as for the Vineyard Wind project (BOEM 2021a) and is outlined in the footnotes in Table E3-1.

Table E-1. Offshore Wind Activities on the U.S. Atlantic Coast (dates shown as of November 1, 2021)

Lease Number	States	Lessee/Developer Name	Project Name	Construction Date	Operations Date	Facility Description	BOEM Permitting Stage*	Power Purchase Agreement/ Offshore Renewable Energy Certificate Status
Active Projects (state)								
N/A (state project)	Maine	New England Aqua Ventus, LLC	NE Aquaventus	2023	2023	11 MW (1 WTG)	N/A	PPA with ME
N/A (state project)	Rhode Island	Deepwater Wind, LLC (now Orsted)	Block Island Wind Farm	2015	2016	30 MW (5 WTGs)	N/A	PPA with RI
Active Projects (federal)								
OCS-A 0483	Virginia	Virginia Electric and Power Company (dba Dominion Virginia Power)	Virginia Commercial Offshore Wind (per SAP)	2024–2025	2026	2,640 MW (205 WTGs); one met buoy	SAP approved; New SAP submitted and approved; COP in progress	No PPAs signed to date
OCS-A 0486	Rhode Island and Connecticut	Revolution Wind, LLC (Orsted and Eversource)	Revolution Wind (Proposed Action)	2023	2023	Up to 880 MW (100 WTGs; two OSSs)	COP in progress; SAP approved	2 PPAs with CT and one PPA with RI
OCS-A 0487; OCS-A 0500 (portions)	New York	Orsted and Eversource	Sunrise Wind	2023	2024	Up to 1,122 MW (102 WTGs)	COP submitted	OREC awarded by NYSERDA (PPA with NY)
OCS-A 0490 (portion)	Maryland	U.S. Wind Inc.	U.S. Wind (Maryland Offshore Wind Project)	2024	2024	1500 MW (125 WTGs)	COP submitted; SAP approved	OREC awarded by State of Maryland
OCS-A 0497	Virginia	Virginia Department of Mines, Minerals and Energy (Orsted and Dominion Energy)	Coastal Virginia Offshore Wind	2021	2021	12 MW (two WTGs-6 MW each); one wave/current buoy	Operating	N/A (research)
OCS-A 0498	New Jersey	Ocean Wind, LLC (Orsted and PSEG)	Ocean Wind	2023	2024	1,100 MW (98 WTGs)	COP in progress SAP approved	OREC awarded by NJ
OCS-A 0499	New Jersey	Atlantic Shores Offshore Wind, LLC	Atlantic Shores	2025	2027	Up to 200 WTG (capacity not provided)	SAP approved; COP submitted	Project 1 has an OREC signed with NJ for 1,510 MW. Project 2 has no OREC or PPAs signed to date.
OCS-A 0500 (portion)	Massachusetts	Bay State Wind LLC (Orsted and Eversource)	Bay State Wind	2026	2027	800 MW; two FLIDAR buoys; one met buoy	COP in progress SAP approved	No PPA signed to date
OCS-A 0501 (north)	Massachusetts	Vineyard Wind LLC	Vineyard Wind 1	2023	2023	800 MW (62 WTGs); two met buoys	ROD issued	PPA with MA
OCS-A 0534 and portion of OCS-A 0501	Massachusetts	New England Wind, LLC	Park City Wind (Phase 1) Commonwealth Wind (Phase 2)	2024	2026	Up to a combined 2,304 MW (130 WTGs or ESP	COP in progress	PPA with CT (Phase 1) No PPA signed to date (Phase 2)

Lease Number	States	Lessee/Developer Name	Project Name	Construction Date	Operations Date	Facility Description	BOEM Permitting Stage*	Power Purchase Agreement/ Offshore Renewable Energy Certificate Status
						positions) for both phases		
OCS-A 0508	North Carolina, Virginia	Avangrid Renewables, LLC	Kitty Hawk Offshore	2025	2026	Up to 69 WTGs; up to two buoys; and up to two platforms	COP in progress; SAP approved	No PPA signed to date
OCS-A 0512 (Project 1 and Project 2)	New York	Equinor Wind US, LLC	Empire Wind 1, Empire Wind 2	2024	2025	Up to 2,400 MW (174 WTGs); two met buoys; one wave/met buoy; one subsea current meter mooring	COP in progress; SAP approved	PPA with NY
OCS-A 0517	New York	South Fork Wind, LLC (Orsted and Eversource)	South Fork Wind Farm	2023	2023	130 MW (up to 12 WTGs); one met buoy	ROD issued COP approved	PPA with NY
OCS-A 0519 (portion; includes former OCS-A 0482)	Delaware, Maryland	Skipjack Offshore Energy, LLC (Orsted)	Skipjack	2023	2023	192 MW (up to 16 WTGs); one met buoy	COP received	OREC awarded by State of Maryland (connection to PJM grid in DE)
OCS-A 0521	Massachusetts	Mayflower Wind Energy, LLC (Shell & EDP Renewables)	Mayflower	2025	2025	Up to 1,600 – 2,400 MW (147 WTGs); one met buoy	SAP approved	PPA with MA (up to 804 MW) Applying for other PPAs
Future Projects (federal)								
OCS-A 0482	Delaware	GSOE I LLC (Orsted and PSEG)	Garden State Offshore Energy	By 2030, spread over 2023–2030			SAP approved	PPA with DE and NJ
OCS-A 0487 (remainder)	Rhode Island	Sunrise Wind, LLC	TBD	By 2030, spread over 2025–2030			SAP approved	No PPAs signed to date
OCS-A 0499	New York/New Jersey	Atlantic Shores	TBD	By 2030, spread over 2026–2030			–	No PPAs signed to date
OCS-A 0500 (remainder)	Massachusetts	Bay State Wind LLC (Orsted and Eversource)	Bay State Wind	By 2030, spread over 2025–2030			SAP approved	No PPAs signed to date
OCS-A 0508 (remainder)	Virginia/North Carolina	Avangrid Renewables, LLC	Kitty Hawk Wind, South	2026–2027			–	No PPAs signed to date
OCS-A 0519 (remainder)	Maryland/Delaware	Skipjack Offshore Energy, LLC (Orsted)	To be determined (TBD)	By 2030, spread over 2023–2030			SAP approved	No PPAs signed to date
OCS-A 0520	TBD (New England)	Equinor Wind US LLC	Beacon Wind	2025–2026			SAP submitted	No PPA signed to date
OCS-A 0522	Massachusetts	Vineyard Wind LLC	Liberty Wind	By 2030, spread over 2025–2030			SAP submitted	No PPAs signed to date

Lease Number	States	Lessee/Developer Name	Project Name	Construction Date	Operations Date	Facility Description	BOEM Permitting Stage*	Power Purchase Agreement/ Offshore Renewable Energy Certificate Status
OCS-A 0532	New Jersey	(Orsted North America)	Ocean Wind 2	By 2030, spread over 2026–2030			SAP approved	OREC awarded by NJ for 1,148 MW
OCS-A 0537	New York/New Jersey		Central Bight	By 2030, spread over 2026–2030			Lease issuance	No PPAs signed to date
OCS-A 0538	New York/New Jersey		Hudson South B				Lease issuance	No PPAs signed to date
OCS-A 0539	New York/New Jersey		Hudson South C				Lease issuance	No PPAs signed to date
OCS-A 0541	New York/New Jersey		Hudson South E				Lease issuance	No PPAs signed to date
OCS-A 0542	New York/New Jersey		Hudson South F				Lease issuance	No PPAs signed to date
OCS-A 0544	New York/New Jersey		Hudson North				Lease issuance	No PPAs signed to date

Notes: – = no data; COP = construction and operations plan; CT = Connecticut; DE = Delaware; MA = Massachusetts; MD = Maryland; ME = Maine; MW = megawatts; NA = not applicable; NJ = New Jersey; NY = New York; NYSERDA = New York State Energy Research and Development Authority; OREC = offshore renewable energy certificate; PPA = power purchase agreement; RI = Rhode Island; ROD = record of decision; SAP = site assessment plan; TBD = to be determined; WTGs = wind turbine generators.

* Under BOEM Permitting Stage, COP status is assumed to be in process, under review, or not yet commenced based on publicly available information.

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Offshore Wind Energy Development Activities

Site Characterization Studies

A lessee is required to provide the results of site characterization activities with its site assessment plan (SAP) or COP. For the purposes of the planned activities effects analysis, BOEM makes the following assumptions for survey and sampling activities:

- Site characterization would occur on all existing leases.
- Site characterization would likely take place in the first 3 years following execution of a lease, since a lessee would likely want to generate data for its COP at the earliest possible opportunity.
- Lessees would likely survey most or all of the proposed lease area during the 5-year site assessment term to collect required geophysical information for siting of a meteorological tower and/or two buoys and commercial facilities (wind turbines). The surveys may be completed in phases, with the meteorological tower and/or buoy areas likely to be surveyed first.
- Lessee would not use air guns, which are typically used for deep penetration two-dimensional or three-dimensional exploratory seismic surveys to determine the location, extent, and properties of oil and gas resources (BOEM 2016).

Table E-2 summarizes the typical site characterization surveys, the types of equipment and/or method used, and which resources the survey information would inform (BOEM 2013, 2016).

Table E-2. Site Characterization Survey Assumptions

Survey Type	Survey Equipment and/or Method	Resource Surveyed or Information Used to Inform
High-resolution geophysical surveys	Side-scan sonar, sub-bottom profiler, magnetometer, multi-beam echosounder	Shallow hazards, archaeological, Bathymetric charting, benthic habitat
Geotechnical/ sub-bottom sampling	Vibracores, deep borings, cone penetration tests	Geological
Biological	Grab sampling, benthic sled, underwater imagery/ sediment profile imaging	Benthic habitat
	Aerial digital imaging; visual observation from boat or airplane	Bird
	Ultrasonic detectors installed on survey vessels used for other surveys	Bat
	Visual observation from boat or airplane	Marine fauna (marine mammals and sea turtles)
	Direct sampling of fish and invertebrates	Fish

Source: BOEM (2016)

Site Assessment Activities

After SAP approval, a lessee can evaluate the meteorological conditions, such as wind resources, with the approved installation of meteorological towers and/or buoys. Site assessment activities have been approved or are in the process of being approved for multiple lease areas consisting of one to three meteorological buoys per SAP (see Table E-1). Site assessment would likely take place starting within 1 to 2 years of lease execution, because preparation of a SAP (and subsequent BOEM review) takes time. This planned activities analysis considers these site assessment activities.

Construction and Operation of Offshore Wind Facilities

Table E-1 lists all offshore wind leasing activities that BOEM considers reasonably foreseeable by lease areas and projects, their permitting stage/assessment, and anticipated timeline.

Monitoring and Mitigation

Future offshore wind projects could require monitoring or mitigation as part of BOEM approvals under the National Environmental Policy Act (NEPA) and OCSLA. Although specific measures are too speculative to include at this time, BOEM anticipates that measures could include actions such as passive acoustic monitoring, trawl surveys, acoustic telemetry, and gillnet or ventless trap surveys.

Commercial Fisheries Cumulative Fishery Effects Analysis

Incorporation by Reference of Cumulative Impacts Study

BOEM has completed a study of impact-producing factors (IPFs) on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (BOEM 2019), which is incorporated by reference. The study identifies cause-and-effect relationships between renewable energy projects and resources and classifies those relationships into a manageable number of IPFs through which renewable energy projects could affect resources. It also identifies the types of actions and activities to be considered in a cumulative impacts scenario. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects and states that such actions and activities may have the same IPFs as offshore wind projects.

The BOEM (2019) study identifies the relationships between IPFs associated with specific past, present, and reasonably foreseeable actions and activities in the North Atlantic OCS which were incorporated into this EIS analysis. If an IPF was not associated with the RWF Project, it was not included in the impacts analysis of planned activities.

As discussed in the BOEM (2019) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the proposed Project or other offshore wind projects, possibly via the same IPFs or via IPFs through which offshore wind projects do not contribute. This Appendix E lists reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

The following existing undersea transmission lines, gas pipelines, and other submarine cables are located near the Project:

- New Shoreham (Block Island), Rhode Island, is served by a submarine power cable from the Block Island Wind Farm to New Shoreham (Block Island).
- A submarine power cable connects Block Island to the mainland electrical grid at Narragansett, Rhode Island.
- Service to Martha's Vineyard is provided by four electric cables from Falmouth, located in three corridors through Vineyard Sound. Two cables are located in the same corridor between Elm Road in Falmouth and West Chop; one is located between Shore Street in Falmouth and Eastville (East Chop), and one connects between Mill Road in Falmouth and West Chop.
- Two cables service Nantucket through Nantucket Sound, from Dennis Port and Hyannis Port to landfall at Jetties Beach.
- Additional submarine cables, including fiber-optic cables and trans-Atlantic cables that originate near Charlestown, Rhode Island; New York City; Long Island, near Trenton, New Jersey; and Wall, New Jersey, are located offshore New England and mid-Atlantic states, but outside the proposed Lease Area.
- Two natural gas pipelines are located offshore Boston, Massachusetts, in Massachusetts Bay and lead to liquified natural gas (LNG) export facilities: the Neptune pipeline and the Northeast Gateway LNG pipeline.

The offshore wind projects listed in Table E-1 that have a COP under review are presumed to include at least one identified cable route. Cable routes have not yet been announced for the remainder of the proposed wind energy projects in Table E-1.

Tidal Energy Projects

The following tidal energy projects have been proposed or studied on the U.S East Coast and are in operation or considered reasonably foreseeable:

- The Bourne Tidal Test Site, located in the Cape Cod Canal near Bourne, Massachusetts, is a testing platform for tidal turbines that was installed in late 2017 by the Marine Renewable Energy Collaborative. The Bourne Tidal Test Site offers a test platform for tidal turbines (MRECo 2017, 2018).
- Cobscook Bay Tidal Project, located in Maine, is a Federal Energy Regulatory Commission-(FERC) licensed tidal project that began operations in 2012. The project owner, Ocean Power Energy Company, has informed FERC that it will not apply for relicensing, and removal and site restoration activities are anticipated to be conducted prior to its current license expiration date in January 2022 (FERC 2012a).

- Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from FERC in 2016. The preliminary permit allows developers to study a project but does not authorize construction.
- The Roosevelt Island Tidal Energy (RITE) Project located in the East Channel of the East River, a tidal strait connecting the Long Island Sound with the Atlantic Ocean in the New York Harbor. In 2005, Verdant Power petitioned FERC for permission to the first U.S. commercial license for tidal power. In 2012, FERC issued a 10-year license to install up to 1 MW of power (30 turbines/10 TriFrames) at the RITE project (FERC 2012b; Verdant Power 2018).

Dredging and Port Improvement Projects

- The following dredging projects have been proposed or studied between New York, New York, and Boston, Massachusetts, and are either in operation or are considered reasonably foreseeable:
- The U.S. Army Corps of Engineers (USACE) New England District partnership with Rhode Island Coastal Resources Management Council (RI CRMC) proposes a project that would dredge approximately 23,700 cubic yards of sandy material from the Point Judith Harbor Federal Navigation Project to widen the existing 15-foot-deep mean lower low water (MLLW) West Bulkhead channel by 50 feet and extend the same channel approximately 1,200 feet into the North Basin area (USACE 2018a).
- The Plymouth Harbor Federal Navigation Project in Plymouth, Massachusetts, includes maintenance dredging of approximately 385,000 cubic yards of sand and silt from approximately 75 acres of the authorized project area in order to restore the project to authorized and maintained dimensions (USACE 2018b).
- The Port of New Bedford was awarded a $15.4 million U.S. Department of Transportation Better Utilizing Investments to Leverage Development grant to improve the port's infrastructure and to help with the removal of contaminated materials. The funding will be used to extend the port's bulkhead, creating room for 60 additional commercial vessels, and additional sites for offshore wind staging (Phillips 2018).
- Proposed New Haven Harbor Improvements would include deepening the main ship channel, maneuvering area, and turning basin to -40 feet MLLW and widening the main channel and turning basin to allow larger vessels to efficiently access the Port of New Haven’s terminals. The proposed improvements would remove approximately 4.28 million cubic yards of predominately glacially deposited silts from the federal channel (USACE 2018c).
- The Nature Conservancy seeks a permit to place an artificial reef array in Narraganset Bay at 130 Shore Road in Narragansett Bay in East Providence, Rhode Island. The proposed work involves the construction of a 0.14-acre artificial reef using 91 pre-fabricated reef modules. The artificial reef array would consist of 58 Pallet Balls (4.0 × 2.9 feet) and 33 Bay Balls (3 × 2 feet). The reef modules would be transported to the project site by barge and lowered to the seafloor by crane (USACE 2019).
- The RI CRMC has awarded funding for five habitat restoration projects in the 19th year of its Rhode Island Coastal and Estuarine Habitat Restoration Trust Fund (RI CRMC 2022). These

projects comprise a dam removal assessment, streambank stabilization on the Woonasquatucket River, salt marsh restoration, habitat restoration and invasive species management, and fish passage improvement on the Saugatucket River (RI CRMC 2018a).

- The Town of Dennis seeks a permit for the selective dredging of multiple navigation and mooring basins within multiple waterways in the towns of Dennis and Yarmouth. Suitable dredged material will be used as nourishment on multiple town-owned beaches in Dennis whereas material that is not deemed suitable for beach nourishment will be disposed of at the Cape Cod Bay Disposal Site and at the South Dennis Landfill. The town is requesting to dredge approximately 434,310 cubic yards from portions of these waterways over 10 years encompassing an area of approximately 96.03 acres (USACE 2018d).

The following port improvement projects have been proposed in Connecticut, Rhode Island, Massachusetts, and/or New Jersey, and are either in operation or are considered reasonably foreseeable:

- The Connecticut Port Authority (CPA) announced a $93 million public-private partnership to upgrade the Connecticut State Pier in New London to support the offshore wind industry (Sheridan 2019). According to the Connecticut Maritime Strategy 2018 (CPA 2018a), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. The development partnership, announced in May 2019, includes a 3-year plan to upgrade infrastructure to meet heavy-lift requirements of Orsted and Eversource offshore wind components (Cooper 2019). Redevelopment of the Connecticut State Pier is considered a reasonably foreseeable activity.
- In Rhode Island, Revolution Wind, LLC has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). This investment will position Rhode Island ports to participate in construction and operation of future offshore wind projects in the region (Rhode Island Governor's Office 2018). The Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable.
- The Massachusetts Clean Energy Center (MassCEC) has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2017a, 2017b, 2017c).
- The MassCEC manages the New Bedford Marine Commerce Terminal in New Bedford, Massachusetts. The 29-acre facility was completed in 2015 and is the first in North America designed specifically to support the construction, assembly, and deployment of offshore wind projects (MassCEC 2018). The New Bedford Port Authority Strategic Plan 2018–2023 contains

goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry, including development of North Terminal with the capacity to handle two separate offshore wind installation projects in the future (Port of New Bedford 2018). Vineyard Wind signed an 18-month lease with the Marine Commerce Terminal in October 2018 (Port of New Bedford 2020) and has supported the New Bedford Port Authority with grants to develop publicly owned facilities to support shore-based operations for offshore wind facilities (Vineyard Wind 2019).

Marine Minerals Use and Ocean Dredged Material Disposal

The closest active lease in BOEM's Marine Minerals Program for sand borrow areas for beach replenishment is located offshore New Jersey near Harvey Cedars, Surf City, Long Beach Township, Ship Bottom, and Beach Haven (Lease Number OCS-A-0505) (BOEM 2018).

In addition, reconnaissance and/or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources. Sand resources identified nearest the Project include locations offshore Rhode Island (between Block Island and Charlestown), Long Island (Rockaway Beach, Long Beach, and Fire Island, New York), and Sandy Hook, New Jersey.

The EPA Region 1 is responsible for designating and managing ocean disposal sites for materials offshore in the region of the Project. The USACE issues permits for ocean disposal sites; all ocean sites are for the disposal of dredged material permitted or authorized under the Marine Protection, Research, and Sanctuaries Act (16 USC 1431 et seq. and 33 USC 1401 et seq.). There are nine active projects along the Massachusetts, Rhode Island, Connecticut, and New York coasts, with the closest dredge disposal project, the Rhode Island Sound Disposal Site (RISDS) located northeast of Block Island (USACE 2018e).

Military Use

Military activities can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, the U.S. Coast Guard (USCG), and other military entities have numerous facilities in the region. Major onshore regional facilities include Joint Base Cape Cod, Naval Station Newport, Newport Naval Undersea Warfare Center, Naval Submarine Base New London, and USCG Academy (BOEM 2013; Epsilon Associates, Inc 2018; RI CRMC 2010). The U.S. Atlantic Fleet also conducts training and testing exercises in the Narraganset Bay Operating Area, and the Newport Naval Undersea Warfare Center routinely performs testing in the area (BOEM 2013).

Marine Transportation

Marine transportation in the region is diverse and sourced from many ports and private harbors from New York to Massachusetts. Commercial vessel traffic in the region includes research, tug/barge, liquid tankers (such as those used for liquid petroleum), cargo, military and search-and-rescue vessels, and commercial fishing vessels. Recreational vessel traffic includes cruise ships, sailboats, and charter boats. A number of federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys.

One new regional maritime highway project that has received funding from the U.S. Department of Transportation (USDOT) Maritime Administration (MARAD) is a new barge service (Davisville/Brooklyn/ Newark Container-on-Barge Service). This service is proposed to run twice each week in state waters between Newark, New Jersey; Brooklyn, New York; and the Port of Davisville in Rhode Island (USDOT MARAD 2021), which is located on Quonset Point, one of the potential O&M locations. The project received grant funding from MARAD in August 2018 (fiscal year 2017) to purchase material for handling equipment for the biweekly barge service (USDOT MARAD 2022).

National Marine Fisheries Service Activities

Research and enhancement permits may be issued for marine mammals protected by the Marine Mammal Protection Act (MMPA) and for threatened and endangered species under the ESA. The National Marine Fisheries Service (NMFS) is anticipated to continue issuing research permits under section 10(a)(1)(A) of the ESA to allow take of certain ESA-listed species for scientific research. Scientific research permits issued by NMFS currently authorize studies on ESA-listed species in the Atlantic Ocean, some of which occur in portions of the Lease Area. Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the Northeast Fisheries Science Center (NEFSC) could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development.

The regulatory process administered by NMFS, which includes stock assessments for all marine mammals and 5-year reviews for all ESA-listed species, assists in informing decisions on take authorizations and the assessment of project-specific and cumulative impacts that consider past, present, and reasonably foreseeable future actions in biological opinions. Stock assessments completed regularly under MMPA include estimates of potential biological removal that stocks of marine mammals can sustainably absorb. MMPA take authorizations require that a proposed action have no more than a negligible impact on species or stocks, and that a proposed action impose the least practicable adverse impact on the species. MMPA authorizations are reinforced by monitoring and reporting requirements so that NMFS is kept informed of deviations from what has been approved. Biological opinions for federal and non-federal actions are similarly grounded in status reviews and conditioned to avoid jeopardy and to allow continued progress toward recovery. These processes help to ensure that, through compliance with these regulatory requirements, a proposed action would not have a measurable impact on the conservation, recovery, and management of the resource.

Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for research on protected species for scientific purposes. These scientific research permits include the authorization of directed take for activities such as capturing animals and taking measurements and biological samples to study their health, tagging animals to study their distribution and

migration, photographing and counting animals to get population estimates, taking animals in poor health to an animal hospital, and filming animals. NMFS also issues permits for enhancement purposes; these permits are issued to enhance the survival or recovery of a species or stock in the wild by taking actions that increase an individual's or population's ability to recover in the wild. In waters near the Lease Area, scientific research and enhancement permits have been issued previously for satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans, research on reproduction, mortality, health, and conservation issues for North Atlantic Right Whales, and research on population dynamics of harbor and gray seals. Reasonably foreseeable future impacts from scientific research and enhancement permits include physical and behavioral stressors (e.g., restraint and capture, marking, implantable and suction tagging, biological sampling).

Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Project would be located; the State of New York, state of Rhode Island, and Commonwealth of Massachusetts regulate commercial fisheries in state waters (within 3 nautical miles of the coastline). There are several aquaculture sites in Narragansett Bay; however, the Lease Area and the RWEC centerline does not intersect any of these sites (Suffolk County 2018). The closest aquaculture site to the RWEC centerline is located on the western shoreline of Conanicut Island, approximately 1,427 feet (435 m) from the RWEC route centerline (vhb 2022).

The project overlaps two of NMFS' eight regional councils to manage federal fisheries: Mid-Atlantic Fishery Management Council (MAFMC) which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and North Carolina; and New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2016). The councils manage species with many fishery management plans that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2019). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries Commission (ASMFC). ASMFC is composed of the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and NMFS under the framework of the ASMFC (2019).

The fishery management plans of the Councils and ASMFC were established, in part, to manage fisheries to avoid overfishing. They accomplish this through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. These various measures can further reduce (or increase) the size of landings of commercial fisheries in the Northeast and the Mid-Atlantic regions.

NOAA Fisheries also manages highly migratory species (HMS), such as tuna and sharks, that can travel long distances and cross domestic boundaries.

Global Climate Change

Section 7.6.1.4 of the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (Minerals

Management Service [MMS] 2007) describes global climate change with respect to assessing renewable energy development. Climate change is predicted to affect Northeast fishery species differently (Hare et al. 2016), and the NMFS biological opinion discusses in detail the potential impacts of global climate change on protected species that occur within the proposed action area (NMFS 2013).

The Intergovernmental Panel on Climate Change (IPCC) released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5 degrees Celsius (°C) and an increase of 2°C. The report found that climate-related risks depend on the rate, peak, and duration of global warming, and that an increase of 2°C was associated with greater risks associated with climatic changes such as extreme weather and drought; global sea level rise; impacts to terrestrial ecosystems; impacts to marine biodiversity, fisheries, and ecosystems and their functions and services to humans; and impacts to health, livelihoods, food security, water supply, and economic growth (IPCC 2018).

States and regions look to offshore wind as a key component in their strategic plans to meet emissions goals in part because offshore wind can provide a low-carbon/no-carbon electricity supply source for current and increasing needs of electrified heating and transportation. Offshore wind projects produce less net greenhouse gas (GHG) emissions over the life of the projects when compared to other energy sources currently in use. Table E-3 summarizes regional plans and policies that are in place to address climate change, and Table E-4 summarizes resiliency plans.

Table E-3. Climate Change Plans and Policies

Plans and Policies	Summary/Goal
Connecticut	
2008 Global Warming Solutions Act	Sets forth statutory requirements to reduce GHG emissions 10% below 1990 levels by 2020 and 80% below 2001 levels by 2050 (State of Connecticut 2008).
Control of Carbon Dioxides Emissions/CO_2 Budget Trading Program (2008)	Sets forth statutory requirements to establish a carbon dioxide (CO_2) allowance tracking system wherein CO_2 allowance allocations are established under the Connecticut CO_2 Budget Trading Program Base Budget. Budget sources are identified, cataloged, monitored and reported, transferred, and tracked under a certification program in an effort to cap and reduce power sector CO_2 emissions.
Regional Greenhouse Gas Initiative (RGGI) (2009)	The nation's first mandatory, market-based cap-and-trade program to reduce emissions of CO_2. Under the program, which began in 2009, participating RGGI states (Rhode Island, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New York, Vermont, and New Jersey; New Jersey withdrew in 2011) established a regional cap on CO_2 emissions from fossil fuel–fired electric generating facilities, and required these power plants to possess a tradable CO_2 allowance for each ton of CO_2 they emit. Under RGGI, CO_2 allowances are distributed through quarterly allowance auctions.
An Act Concerning Electric and Fuel Cell Electric Vehicles (Public Act 16-135) (2016)	Sets forth several provisions related to electric vehicles (EVs), including requirements related to data collection, EV charging stations, and electric rate structures.
Building A Low Carbon Future for Connecticut: Achieving a 45% GHG reduction by 2030 (2018)	Proposed set of strategies to achieve 45% GHG reduction below 2001 levels target by 2030. These strategies ensure Connecticut is on a downward trajectory to the 80% reduction target by 2050 required by the Global Warming Solutions Act (State of Connecticut 2018a).
2018 Act Concerning Climate Change Planning and Resiliency (Public Act 18-82)	Act passed by the Connecticut General Assembly that adopted GC3's recommendation of 45% GHG mid-term reduction target below 2001 levels by 2030 and integrates GHG reduction more explicitly into the DEEP Comprehensive Energy Strategy (CES) and Integrated Resource Plan (IRP) (State of Connecticut 2018b).
Comprehensive Energy Strategy (CES) (2018)	Connecticut Department of Energy and Environmental Protection (DEEP) update to Connecticut's CES to advance the State's goal of creating a cheaper, cleaner, more reliable energy future for Connecticut's residents and businesses. The CES analyzes energy use and key trends of the region (State of Connecticut 2018c)
Executive Order No. 3, (2019)	Re-establishes and expands the membership and responsibilities of the Governor's Council on Climate change (GC3), originally established in 2015. Orders GC3 to report to the Governor regarding the state's progress on the implementation of the strategies identified in *Building a Low Carbon Future for Connecticut: Achieving a 45% GHG reduction by 2030* (State of Connecticut 2019)

Plans and Policies	Summary/Goal
Integrated Resources Plan (2020)	DEEP is required to prepare an Integrated Resource Plan (IRP) every 2 years, which is comprised of an assessment of the future electric needs and a plan to meet those future needs. Executive Order 3 directed DEEP to analyze pathways and recommend strategies to achieve a 100 percent zero carbon electric supply by 2040 in this IRP (State of Connecticut 2020).
Taking Action on Climate Change and Building a More Resilient Connecticut for All (2021)	Phase 1 report in response to Executive Order 3's request for progress on mitigation strategies and preparation of an Adaptation and Resilience Plan. Provides information on GC3 members and Working Group members, GC3 background and process, the Equity and Environmental Justice Working Group, the impacts of climate change in Connecticut, and recommendations for near-term action (State of Connecticut 2021)
Massachusetts	
Global Warming Solutions Act (GWSA) of 2008	Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emission level in 2020, at least 80% reduction in 2050. Full implementation of these policies is projected to result in total net reduction of 25.0 million metric tons of CO_2 equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a).
Massachusetts Clean Energy and Climate Plan (CECP) for 2020; 2015 CECP Update	Policies that aim to reduce GHG emissions in the commonwealth across all sectors; full implementation of policies would result in reducing emissions by at least 25% below 1900 level in 2020 (Commonwealth of Massachusetts 2015).
Executive Order 569, Establishing an Integrated Climate Strategy for the Commonwealth and "Act to Promote Energy Diversity" (2016)	Calls for large procurements of offshore wind and hydroelectric resources (Commonwealth of Massachusetts 2016).
Environmental Bond Bill and An Act to Advance Clean Energy (2018)	Sets new targets for offshore wind, solar, and storage technologies; expands Renewable Portfolio Standard requirements for 2020–2029; establishes a Clean Peak Standard; and permits fuel switching in energy efficiency programs (Commonwealth of Massachusetts 2018a).
Massachusetts State Hazard Mitigation and Climate Adaption Plan 2018	Updated 2013 plan to comprehensively integrate climate change impacts and adaptation strategies with hazard mitigation planning while complying with federal requirements for state hazard mitigation plans and maintaining eligibility for federal disaster recovery and hazard mitigation funding under the Stafford Act. The plan will next be submitted to the Federal Emergency Management Agency (FEMA) for approval. In 2020, a new 2030 emissions limit and CECP for 2030 will be published (Commonwealth of Massachusetts 2018a, 2018b).
Massachusetts 2050 Decarbonization Roadmap	A planning process by the Massachusetts Executive Office of Energy and Environmental Affairs to identify cost-effective and equitable strategies to ensure Massachusetts reduces GHG emissions by at least 85% by 2050 and achieves net-zero emissions (Commonwealth of Massachusetts 2020a)

Plans and Policies	Summary/Goal
Massachusetts Clean Energy and Climate Plan (CECP) for 2030	The Clean Energy and Climate Plan for 2030 (2030 CECP) provides details on the actions the Commonwealth will undertake through the next decade to ensure the 2030 emissions limit is met. The 2030 CECP is prepared in coordination with the development of the 2050 Decarbonization Roadmap such that the strategies, policies, and actions outlined in the 2030 CECP can help the Commonwealth achieve net zero GHG emissions by 2050. The Interim 2030 CECP was built upon the 2020 CECP and the 2015 CECP Update (Commonwealth of Massachusetts 2020b).
2030 GHG Emissions Limit	The 2030 emissions limit of 45% below the 1990 GHG emissions level was set on December 30, 2020, in accordance with Executive Order 569 to help the Commonwealth meet the 2050 emissions limit (Commonwealth of Massachusetts 2020c)
Net Zero by 2050 Emissions Limit	A 2050 statewide emissions limit of net zero GHG emissions was established by the Commonwealth. This is defined as a level of statewide GHG emissions that is equal in quantity to the amount of CO_2 or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is 85 percent below the 1990 level (Commonwealth of Massachusetts 2020d).
New York	
Reforming the Energy Vision (New York State 2014)	State's energy policy to build integrated energy network; Clean energy goal to reduce GHGs by 40% by 2030 and by 80% by 2050.
Order Adopting a Clean Energy Standard (State of New York Public Service Commission 2016)	Requirement that 50% of New York's electricity come from renewable energy sources by 2030.
New York State Energy Plan 2015; 2017 Biennial Report to 2015 Plan (New York State Energy Research Development Authority [NYSERDA] 2015, 2017a)	Requires 40% reduction in GHGs from 1990 levels; 50% electricity will come from renewable energy resources; and 600 trillion British thermal units (Btu) increase in statewide energy efficiency.

Plans and Policies	Summary/Goal
Governor Cuomo State of State Address 2017, 2018, 2021	2017: Set offshore wind energy development goal of 2,400 MW by 2030 (Governor's Office 2017a). 2018: Procurement of at least 800 MW of offshore wind power between two solicitations in 2018 and 2019; new energy efficiency target for investor-owned utilities to more than double utility energy efficiency progress by 2025; energy storage initiative to achieve 1,500 MW of storage by 2025 and up to 3,000 MW by 2030 (Governor Office 2018b, 2018c). 2021: The governor's 2021 agenda—Reimagine | Rebuild | Renew—establishes a goal of building out its renewable energy program. The agenda notes the development of two new offshore wind farms more than 20 miles off the shore of Long Island, the creation of dedicated offshore port facilities, and additional transmission capacity development.
New York State Offshore Wind Master Plan (2017) (NYSERDA 2017b)	Grants NYSERDA ability to award 25-year long-term contracts for projects ranging from approximately 200 MW to approximately 800 MW, with an ability to award larger quantities if sufficiently attractive proposals are received. Each proposer is also required to submit at least one proposal of approximately 400 MW. Bids are due in February 2019, awards are expected in spring 2019; and contracts are expected to be executed thereafter.
2020 Offshore Wind Solicitation	As noted above, NYSERDA has provisionally awarded two offshore wind projects, totaling 2,490 MW. Empire Wind 2 (1,260 MW) and Beacon Wind (1,230 MW) of Equinor Wind US LLC will generate enough clean energy to power 1.3 million homes and will be major economic drivers, supporting the following: • More than 5,200 direct jobs • Combined economic activity of $8.9 billion in labor, supplies, development, and manufacturing statewide • $47 million in workforce development and just access funding
The Climate Leadership and Community Protection Act (CLCPA), enacted on July 18, 2019, signed into law in July 2019 and effective January 1, 2020	CLCPA establishes economy-wide targets to reduce GHG emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050.
Rhode Island	
Air Pollution Control Regulation No. 37-Rhode Island's Low-Emission Vehicle Program (2001)	The purpose of this regulation is to specify the requirements for Rhode Island's Low-Emission Vehicle Program to reduce motor vehicle GHG emissions.
Air Pollution Control Regulation No. 46, 'CO2 Budget Trading Program' (2008)	The purpose of this regulation is to establish the Rhode Island component of the CO_2 Budget Trading Program, which is designed to reduce anthropogenic emissions of CO_2 from the CO_2 budget sources in an economically efficient manner. Budget sources are identified, cataloged, monitored and reported, transferred, and tracked under a certification program in an effort to cap and reduce power sector CO_2 emissions.

Plans and Policies	Summary/Goal
RGGI (2009)	The RGGI is the nation's first mandatory, market-based cap-and-trade program to reduce emissions of CO_2. Under the program, which began in 2009, Rhode Island receives CO_2 allowance proceeds, which are invested in a variety of consumer benefit programs, including energy efficiency, renewable energy, direct energy bill assistance and other GHG reduction programs.
Resilient Rhode Island Act (2014)	Established the Executive Climate Change Coordinating Council (EC4) and set specific GHG reduction targets; incorporates consideration of climate change impacts into the powers and duties of all state agencies (State of Rhode Island 2014).
Energy 2035 Rhode Island State Energy Plan (2015)	Long-term comprehensive strategy for energy services across all sectors using a secure, cost-effective, and sustainable energy system; plan to increase sector fuel diversity, produce net economic benefits, and reduce GHG emissions by 45% by the year 2035 (State of Rhode Island 2015b).
Governor's Climate Priorities (2018) Executive Order 15-17, 17-06	Increasing in-state renewable energy tenfold by 2020 (to 1,000 MWs) through new development and regional procurement (State of Rhode Island 2015a, 2017, 2018a).
Rhode Island Greenhouse Gas Emissions Reductions Plan (2016)	Targets for GHG reductions: 10% below 1990 levels by 2020; 45% below 1990 levels by 2035; 80% below 1990 levels by 2040 (State of Rhode Island 2016).
Resilient Rhody (2018)	Planning document outlining climate resiliency actions; focuses on leveraging emissions reduction targets and adaptation (State of Rhode Island 2018b).
Executive Order 20-01, Advancing a 100% Renewable Energy Future for Rhode Island by 2030	Calls the Rhode Island Office of Energy Resources (OER) to conduct economic and energy market analyses to develop an actionable plan to reach 100% renewable electricity by 2030. The OER must provide this specific and implementable action plan by December 31, 2020 (State of Rhode Island 2020a).
The Road to 100% Renewable Electricity by 2030 in Rhode Island	Provides economic analysis of the key factors that will guide Rhode Island in the coming years as the state accelerates its adoption of carbon-free renewable resources. The OER developed specific policy, programmatic, planning, and equity-based actions that will support achieving the 100% renewable electricity goal (Rhode Island OER 2020).
2021 Act on Climate	This legislation updates Rhode Island's climate-emission reduction goals laid out in the 2014 Resilient RI Act and address areas such as environmental injustices, public health inequities, and a fair employment transition as fossil-fuel jobs are replaced by green energy jobs. The state will develop a plan to incrementally reduce climate emissions to net-zero by 2050 and is to be updated every 5 years (State of Rhode Island 2020b).

Table E-4. Resiliency Plans and Policies in the Lease Area

Plans and Policies	Summary
Connecticut	
Act Authorizing Municipal Climate Change and Coastal Resiliency Reserve Funds (CCCRRF) (Public Act 19-77)	Act approved July 1, 2019. Upon the recommendation of the chief elected official and budget-making authority, and approval of the legislative body of a municipality, the reserve fund may be used and appropriated to pay for municipal property losses, capital projects and studies related to mitigating hazards and vulnerabilities of climate change including, but not limited to, land acquisition (Connecticut General Assembly 2019).
Resilient Connecticut	Connecticut Institute for Resilience & Climate Adaptation (CIRCA) was awarded an $8 million from the National Disaster Relief Competition(NDRC) to develop the *Resilient Connecticut* project. Coordination of CIRCA, state agencies, and regional councils of governments and municipalities initiated the development of a Planning Framework to establish resilient communities through smart planning that incorporates economic development framed around transit-oriented development, conservation strategies, and critical infrastructure improvements (Resilient Connecticut (CIRCA 2021).
An Act Concerning Climate Change Adaptation (Public Act 21-115)	Act approved July 6, 2021. This proposal addresses the rising seas, frequent flooding, heat waves, and drought expected between now and 2050. It prioritizes the protection of frontline vulnerable communities and provides Connecticut's communities more options to move from adaptation and resilience planning to implementing their project pipeline, including the use of nature-based and green infrastructure solutions (Connecticut General Assembly 2021).
Massachusetts	
Municipal Vulnerability Preparedness grant program (MVP) (2017)	Provides support for cities and towns to plan for resiliency and implement key climate change adaptation actions for resiliency. The City of New Bedford has received MVP designation as of November 1, 2018 (Commonwealth of Massachusetts 2019a).
Coastal Grant and Resilience Program	Provides financial and technical support for local efforts to increase awareness and understanding of climate impacts, identify and map vulnerabilities, conduct adaptation planning, redesign vulnerable public facilities and infrastructure, and implement non-structural approaches that enhance natural resources and provide storm damage protection (Commonwealth of Massachusetts 2019b).
General Appropriations Bill, FY2022 (Section 2000-0101)	Designation of funds for the Executive Office of Energy and Environmental Affairs to coordinate and implement strategies for climate change adaptation and preparedness, including, but not limited to, resiliency plans for the commonwealth in a report to be delivered by February 3, 2022 (Commonwealth of Massachusetts Legislature 2021).

Plans and Policies	Summary
New York	
Part 490 of Community Risk and Resiliency Act (CRRA) of 2014	Establishes statewide science-based sea-level rise projections for coastal regions of the state. As of 2019, DEC is in the process of developing a State Flood Risk Management Guidance document for state agencies (New York State Department of Environmental Conservation [NYSDEC] n.d. [2019]).
NY Rising Community Reconstruction (NYRCR) (2018)	$20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Three projects were announced for Suffolk County and five for Nassau County (Governor's Office 2018c).
Water Infrastructure Improvement Act (WIIA), Water Quality Improvement Project (WQIP) Program, and Intermunicipal Grant (IMG)	$600 million available to communities statewide for programs to fund projects to upgrade infrastructure and make communities more resilient to flooding and other impacts of climate-driven severe storms and weather events (Governor's Office 2021).
Rhode Island	
Nantucket's Coastal Resilience Plan	The plan is currently under development, and while no actions have been identified to date, potential shoreline management activities could include sediment management, construction of seawalls and similar structures, and other activities (Town and County of Nantucket 2018a, 2018b).
Shoreline Change Special Area Management Plan (Beach SAMP)	The RI CRMC developed and adopted the Beach SAMP to improve the state's resilience and manage the shoreline (RI CRMC 2018b).

Oil and Gas Activities

The proposed Project is located in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the U.S. OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (The White House 2020a). The South Atlantic Planning Area includes the OCS off South Carolina, Georgia, and northern Florida. On September 25, 2020, the White House issued a similar memorandum for the Mid-Atlantic Planning Area that lies south of the northern administrative boundary of North Carolina (The White House 2020b). This withdrawal prevents consideration of these areas for any leasing for purposes of exploration, development, or production during the 10-year period beginning July 1, 2022, and ending June 30, 2032. However, at this time, there has been no decision by the Secretary of the Interior regarding future oil and gas leasing in the North Atlantic or remainder of the Mid-Atlantic Planning Areas. Existing leases in the withdrawn areas are not affected.

BOEM issues geological and geophysical (G&G) permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible human-made, seafloor, or geological hazards; and locate potential archeological and benthic resources. G&G surveys are typically classified into the following categories by equipment and survey type:

- deep-penetration seismic airgun surveys (2-D, 3-D, 4-D, ocean-bottom nodal, and azimuth multi-vessel surveys)
- airgun HRG surveys that are used to investigate the shallow subsurface for geohazards (also known as shallow hazard surveys) and that are used during initial site evaluation, drilling rig emplacement, and platform or pipeline design and emplacement
- electromagnetic surveys, deep stratigraphic and shallow test drilling, and various remote-sensing methods
- non-airgun HRG surveys (similar to those used to support OCS wind energy leasing and site assessment activities) to detect and monitor geohazards, archaeological resources, and benthic communities
- geological and geotechnical seafloor sampling (similar to those used to support OCS wind energy leasing and site assessment activities) to assess the suitability of seafloor sediments for supporting structures (e.g., platforms, pipelines, and cables)

Detailed information on each of the specific G&G survey types and descriptions can be found in Appendix F of *Gulf of Mexico OCS Proposed Geological and Geophysical Activities: Western, Central, and Eastern Planning Areas; Final Programmatic Environmental Impact Statement* (BOEM 2017).

There are currently no G&G permits under BOEM review for areas offshore of the northeast Atlantic states; however, areas under consideration for G&G surveys are located in federal waters offshore from Delaware to Florida (BOEM 2021b).

Eight LNG ports are located on the East Coast of the United States. Table E-5 lists existing, approved, and proposed LNG ports on the East Coast of the United States that provide (or may in the future provide) services such as natural gas export, natural gas supply to the interstate pipeline system or local distribution companies, or storage of LNG for periods of peak demand, or production of LNG for fuel and industrial use (FERC 2021).

Table E-5. Liquid Natural Gas Terminals Located in the Northeastern United States

Terminal Name	Type	Company	Jurisdiction	Distance from Project (approximate)	Status
Everett, MA	Import terminal	GDF SUEZ—DOMAC	FERC	90 miles north	Existing
Offshore Boston, MA	Import terminal	GDF SUEZ – Neptune LNG	U.S. Department of Transportation Maritime Administration (MARAD)/USCG	100 miles north	Existing
Offshore Boston, MA	Import terminal, authorized to re-export delivered LNG	Excelerate Energy—Northeast Gateway	MARAD/USCG	95 miles north	Existing
Cove Point, MD (Chesapeake Bay)	Import terminal	Dominion—Cove Point LNG	FERC	340 miles southwest	Existing
Cove Point, MD (Chesapeake Bay)	Export terminal	Dominion—Cove Point LNG	FERC	340 miles southwest	Existing
Elba Island, GA (Savannah River)	Import terminal	El Paso—Southern LNG	FERC	835 miles southwest	Existing
Elba Island, GA (Savannah River)	Export terminal	Southern LNG Company	FERC	835 miles southwest	Existing
Jacksonville, FL	Export terminal	Eagle LNG Partners	FERC	960 miles southwest	Approved

Source: FERC (2021)

Onshore Development Activities

Onshore development activities that may contribute to impacts from planned activities include visible infrastructure such as onshore wind turbines and cell towers, port development, and other energy projects such as transmission and pipeline projects. Coastal development projects permitted through regional planning commissions and towns may also contribute to impacts from planned activities. These may include residential, commercial, and industrial developments spurred by population growth in the region (Table E-6).

Table E-6. Existing, Approved, and Proposed Onshore Development Activities

Type	Description
Local planning documents	• Suffolk County Master Plan (Suffolk County 2015) • A City Master Plan: New Bedford 2020 (City of New Bedford 2010) • Town of North Kingstown Comprehensive Plan Update 2008 (Town of North Kingstown 2008) • Washington County Transfer of Development Rights (TDR) Study (Washington County Regional Planning Council 2012) • North Kingstown Comprehensive Plan Re-Write 2019 (Interface Studio 2019)
Onshore wind projects	• According to the U.S. Geological Survey (USGS), there are nine onshore wind projects located within the 41-mile viewshed of the project (USGS 2018).
Communications towers	• There are numerous communications towers located in Suffolk County, on offshore islands, and within the viewshed of the proposed Project components. Within the recreation/tourism geographic analysis area, there are 864 communications towers, 10 of which exceed the Federal Aviation Administration (FAA) height limit for marking/lighting requirements (FAA 2016). • The East Hampton Town Board is replacing its aging 800-megahertz frequency emergency communication system tower to a 700-megahertz system with updated equipment. This will require the replacement of a 150-foot communication tower with a 300-foot lattice tower and the raising of a 55-foot monopole to 85 feet. This upgrade also requires replacing antennas at towers near the East Hampton Airport in Wainscott, at the Amagansett firehouse, and at the East Hampton Town Hall complex (Chinese 2018).
Development projects	• As a part of New York State's $100 billion infrastructure project, $5.6 billion will go to transform the Long Island Railroad (LIRR) to improve system connectivity. Within Suffolk County, the following stations will receive funds for upgrades: Brentwood, Deer Park, East Hampton, Northport, Ronkonkoma, Stony Brook, Port Jefferson, and Wyandanch. The East Hampton historic LIRR station will undergo upgrades and modernizations (Metropolitan Transit Authority 2017; Governor's Office 2017b). Additional plans for transit-oriented design (TOD) and highway improvements are planned in Suffolk County in state and county planning documents. • The Division of Statewide Planning, Rhode Island Department of Transportation, and Rhode Island Public Transit Authority prepared the Rhode Island State Transportation Improvement Program (STIP) for the Federal Fiscal Year (FFY) 2022-2023 for the adoption by the State Planning Council (State of Rhode Island 2021). • Fire Island Inlet to Montauk Point (FIMP) Project is a $1.2 billion project by the USACE, NYDEC, and Long Island, NY, municipalities to engage in inlet management; beach, dune and berm construction; breach response plans; raising and retrofitting 4,400 homes; road-raising; groin modifications; and coastal process features. Within Suffolk County, portions of the Towns of Babylon, Islip, Brookhaven, Southampton, and East Hampton; 12 incorporated villages along Long Island's south shore (mainland); Fire Island National Seashore; and the Poospatuck and Shinnecock Indian Reservations will be involved in this project (USACE 2018f).

Type	Description
	• The USACE is working to remediate and cleanup a former defense site (former NIKE Battery PR-58 and Disaster Village Training Area) at Quonset Development Corporation in North Kingstown, RI. A feasibility study was performed from 2014 to 2016, and the final remedial investigation/feasibility study was published in 2016. Pre-design investigations, followed by remedial designs and engineering plans, and remedial action is proposed for 2021 (USACE 2018g). • The Massachusetts Department of Environmental Protection (MassDEP) Bureau of Air and Waste approved National Grid's application for the construction and operation of a diesel generator and a battery electric storage system at an existing electric generating facility located at 32 Bunker Road in Nantucket, approximately 1 mile north of the coastline. The facilities are anticipated to be operational in 2019 (MassDEP 2017; Utility Dive 2018).
Port studies/upgrades	The USACE completed the Lake Montauk Harbor Feasibility Study in 2020. The study determined that Lake Montauk Harbor has insufficient channel and depth to support commercial fishing fleet activities. The study evaluated a range of alternative navigation improvement plans; the recommended plan consisted of deepening the existing navigation channel to -17 feet MLLW depth, creating a deposition basin immediately east of the channel at a width of 100 feet, and placing dredged material on the shoreline west of the inlet for a distance of 3,000 feet and a width of approximately 44 feet. Ports in New York, Connecticut, Rhode Island, and Massachusetts may require upgrades to support the offshore wind industry developing in the northeastern United States. Upgrades may include onshore developments or underwater improvements (such as dredging). • In December 2017, NYSERDA issued an offshore wind master plan that assessed 54 distinct waterfront sites along the New York Harbor and Hudson River and 11 distinct areas with multiple small sites along the Long Island coast. Twelve waterfront areas and five distinct areas were singled out for "potential to be used or developed into facilities capable of supporting OSW projects" (Table 26; NYSERDA 2017b). Nearly all identified sites would require some level of infrastructure upgrade (from minimal to significant) depending on OSW activities intended for the site. Particular sites of interest include Red Hook-Brooklyn, South Brooklyn Marine Terminal, and the Port of Coeymans (NYSERDA 2017b). For additional information regarding specific proposed improvements to these ports, see DockNYC (2018), Capital Region Economic Development Council (2018), American Association of Port Authorities (2016), Rulison (2018), and New York City Economic Development Corporation (2018). • The CPA is currently evaluating proposals from parties to develop, finance, and manage the Connecticut State Pier in New London under a long-term operating agreement (CPA 2018b). According to the Connecticut Maritime Strategy 2018 (CPA 2018a), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. Redevelopment of the State Pier is considered a reasonably foreseeable activity, though specific redevelopment plans are not yet available. • In Rhode Island, DWW has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). The

Type	Description
	Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable. • The MassCEC has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2017a, 2017b, 2017c). The Draft New Bedford Port Authority Strategic Plan 2018 – 2023 contains goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry (MassCEC 2018; Port of New Bedford 2018), but no new improvements were identified. • New York State proposed port improvements include the governor's 2021 agenda—Reimagine | Rebuild | Renew—which includes upgrades to create five dedicated port facilities for offshore wind, including the following: • The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany • An offshore wind turbine staging facility and O&M hub to be established at the South Brooklyn Marine Terminal • Increasing the use of the Port of Coeymans for cutting-edge turbine foundation manufacturing • Buttressing ongoing O&M out of Port Jefferson and Port of Montauk Harbor in Long Island

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APPENDIX E1

Description and Screening of Relevant Offshore Wind and Non–Offshore Wind Impact-Producing Factors and Negligible Impact Determinations

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

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Introduction

The Bureau of Ocean Energy Management (BOEM) developed the tables in Appendix E1 for each resource category based on the 2019 study titled *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). The next page provides an overview table of the impact-producing factors (IPFs) considered for each resource in the environmental impact statement (EIS).

Tables E1-1 to E2-21 provide an analysis of the relevant ongoing and future non–offshore wind activities by IPF for each resource, as well as a reference to where in the Revolution Wind Farm and Revolution Export Cable Project EIS each of those IPFs is analyzed in relation to future offshore wind activities and the Proposed Action and alternatives, if applicable. Some IPFs were determined either not applicable or to have negligible impacts and therefore do not warrant detailed analysis in the EIS pursuant to 40 CFR 1502.15. In these cases, IPF analysis is solely provided in Tables E1-1 to E2-21.

A full list of abbreviations is provided in the EIS's Abbreviations section. Please refer to this section for abbreviations used in the tables in this appendix.

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Appendix E1 Overview Table

IPFs	Air		Bats		Benthic Habitat and Invertebrates		Birds		Coastal Habitats and Fauna		Commercial Fisheries and For-Hire Recreational Fishing		Cultural Resources		Demographics, Employment, and Economics		Environmental Justice		Finfish and Essential Fish Habitat		Land Use and Coastal Infrastructure		Marine Mammals		Navigation and Vessel Traffic		Other Uses		Recreation and Tourism		Sea Turtles		Visual Resources		Water Quality		Wetlands and Other Waters of the United States	
	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
Accidental releases	X	X			X		X	X			X		X	X				X	X		X	X	X				X	X			X				X	X		X
Air emissions	X	X															X	X																				
Anchoring					X						X		X						X						X				X	X	X				X			
Bycatch					X																		X								X							
Discharges					X													X									X	X							X	X		X
Electromagnetic fields					X														X		X	X	X								X							
Energy generation, energy security															X																							
Light			X	X	X		X	X			X		X	X	X		X		X		X	X	X				X	X	X	X	X		X	X				
New cable emplacement and maintenance				X	X		X	X		X	X		X	X	X		X	X	X		X	X	X		X		X	X	X	X	X				X	X		
Noise			X	X	X		X	X		X	X						X	X	X		X	X	X				X	X	X	X	X							
Port utilization					X							X				X			X		X	X	X		X		X	X	X	X	X				X	X		
Presence of structures			X	X	X		X	X		X	X		X	X	X		X	X	X		X	X	X		X		X	X	X	X	X		X	X	X	X		X
Regulated fishing effort											X																											
Sediment deposition and burial					X														X				X								X							X
Traffic					X		X	X			X				X	X	X	X	X				X		X	X	X		X	X	X							
Climate change	X	X			X		X	X		X	X		X	X	X		X		X				X				X	X			X							
Ocean acidification					X		X	X											X				X								X							

Notes: Off = Offshore, On = Onshore

Air Quality

Table E1-1. Summary of Activities and the Associated Impact-Producing Factors for Air Quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/ hazmat	Accidental releases of air toxics or HAPS are due to potential chemical spills. Ongoing releases occur in low frequencies. These could lead to short-term periods of toxic pollutant emissions through surface evaporation. According to the U.S. Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and offshore it was less than 70,000 barrels.	Accidental releases of air toxics or HAPS would be due to potential chemical spills. See Table E1-4 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. These could lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts would be short term and limited to the local area at and around the accidental release location.	Air quality impacts associated with accidental spills from other reasonably foreseeable projects could also occur; however, releases would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Therefore, impacts to air quality would be **negligible** adverse.	**Offshore:** Alternatives B through F would result in air quality impacts from air emissions associated with accidental spills during construction and installation. Releases would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Construction under Alternatives C through F could result in a reduced risk of inadvertent spills due to the reduced number of installed WTGs, resulting in a potential decrease in Project-related spill emissions. However, impacts to air quality under Alternatives B through F would still be **negligible** adverse. Once the RWF has been constructed, spills are unlikely. Air quality impacts associated with any accidental spills would be short term, localized, and generally small in volume and would not contribute to air quality in measurable amounts. Alternatives C through F would result in O&M and decommissioning impacts to air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. However, impacts to air quality under Alternatives B through F would be **negligible** adverse. BOEM estimates that the Project would result in a 56% incremental increase in total chemical usage over the No Action Alternative in the water quality geographic analysis area. However, with the implementation of EPMs and compliance with regulations, the incremental additional effects of accidental releases from the Proposed Action would not contribute appreciably to overall impacts on air quality. Project-related accidental spills or discharges, including those associated with vessel allisions or collisions, associated with Alternatives C through F would result in air quality impacts at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, when combined with past, present, and reasonably foreseeable projects, Alternatives B through F would result in **negligible** adverse cumulative impacts to air quality due to accidental releases.
				Onshore: Inadvertent spills in onshore waters during construction, such as the release of fuels and oils from vehicles or infrastructure, which would disperse rapidly, would be classified as routine and would be localized, short term, and minor (BOEM 2015). Therefore,

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
				negligible adverse impacts to air quality from onshore spills are anticipated from the Proposed Action during construction and installation and O&M. The Proposed Action when combined with past, present, and other reasonably foreseeable projects would also result in short-term and **negligible** adverse cumulative impacts on air quality. Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse.
Air emissions: Construction and decommissioning	Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the CAA to meet set standards. Air quality has generally improved over the last 35 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic coast remain in nonattainment for O_3, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and offshore wind is part of these goals. Primary processes and activities that could affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.	The largest air quality impacts over the next 35 years would occur during the construction phase of any one project; however, projects would be required to comply with the CAA. During the limited construction and decommissioning phases, emissions could occur that are above de minimis thresholds and would require offsets and mitigation. Primary emission sources would be due to increased commercial vehicular traffic, air traffic, public vehicular traffic, and combustion emissions from construction equipment as well as fugitive emissions from construction-generated dust. As projects come online, power generation emissions overall would decline, and the industry as a whole would have a net benefit on air quality.	See Section 3.4.1.1 for analysis.	See Sections 3.4.2.2 and 3.4.2.3 for analysis.
Air emissions: O&M		Activities associated with O&M of onshore wind projects would have a proportionally very small contribution to emissions compared to construction and decommissioning activities over the next 35 years. Emissions would largely be due to commercial vehicular traffic and operation of emergency diesel generators. Such activity would result in short-term, intermittent, and widely dispersed emissions and small air quality impacts.	See Section 3.4.1.1 for analysis.	See Sections 3.4.2.2 and 3.4.2.3 for analysis.
Air emissions: Power generation emissions reductions		Many Atlantic states have committed to clean energy goals, with offshore wind playing a large role. Other reductions include transitioning to onshore wind and solar. The No Action Alternative without implementation of other future offshore wind projects could result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. Unless substituted by other, non–offshore wind sources, these facilities could consist of new natural gas–fired power plants or coal-fired, oil-fired, or clean coal–fired plants. These types of facilities would likely have larger and	See Section 3.4.1.1 for analysis.	See Sections 3.4.2.2 and 3.4.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
		continuous emissions and result in greater regional-scale impacts on air quality.		
Climate change	The construction and installation, O&M, and decommissioning of offshore wind projects would produce GHG emissions (nearly all CO_2) that can contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. CO_2 is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere. Hence, the impact of GHG emissions does not depend upon the source location. Increasing energy production from offshore wind projects would likely decrease GHG emissions by replacing energy from fossil fuels.	Development of future onshore wind projects would produce a small overall increase in GHG emissions over the next 35 years. However, these contributions would be very small compared to the aggregate global emissions. The impact on climate change from these activities would be very small. As more projects come online, some reduction in GHG emissions would be expected from modifications of existing fossil fuel facilities to reduce power generation. Overall, it is anticipated that there would be no cumulative impact on global warming as a result of onshore wind project activities.	See Section 3.4.1.1 for analysis.	See Sections 3.4.2.2 and 3.4.2.3 for analysis.

Bats

Table E1-2. Summary of Activities and the Associated Impact-Producing Factors for Bats

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure-level long-term but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur as recent research has shown that bats could be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized.	Similar to ongoing activities, noise associated with pile-driving activities would be limited to nearshore waters, and these high-intensity but low-exposure risks would not be expected to result in direct impacts. Some indirect impacts (i.e., displacement from potentially suitable foraging habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized, and no population-level effects would be expected.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis during offshore activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Noise: Onshore Construction	Onshore construction occurs regularly for generic infrastructure projects in the bats geographic analysis area. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Any displacement would only be temporary. No individual or population-level impacts would be expected. Some bats roosting in the vicinity of construction activities could be disturbed during construction but would be expected to move to a different roost farther from construction noise. This behavior would not be expected to result in any impacts as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998).	Onshore construction is expected to continue at current trends. Some behavioral responses and avoidance of construction areas could occur (Schaub et al. 2008). However, no injury or mortality would be expected.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis during onshore activities.
Presence of structures: Migration disturbances	There could be few structures scattered throughout the offshore bats geographic analysis area, such as navigation and weather buoys and light towers (NOAA 2020a). Migrating bats can easily fly around or over these sparsely distributed structures, and no migration disturbance would be expected. Bat use of offshore areas is very limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS, and no population-level effects would be expected.	The infrequent installation of future new structures in the marine environment of the next 35 years is expected to continue. As described under Ongoing Activities, These structures would not be expected to cause disturbance to migrating tree bats in the marine environment.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis.
Presence of structures: Turbine strikes	There could be few structures in the offshore bats geographic analysis area, such as navigation and weather buoys, turbines, and light towers (NOAA 2020a). Migrating tree bats can easily fly around or over these sparsely distributed structures, and no strikes would be expected.	The infrequent installation of future new structures in the marine environment of the next 35 years is expected to continue. As described to the left under Ongoing Activities, these structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis.
New cable emplacement/maintenance	Cable emplacement and maintenance activities are expected to continue to follow current trends. Potential direct effects on individuals could occur if these activities include tree removal when bats are potentially present. Injury or mortality could occur if trees being removed are occupied by bats at the time of removal. While there is some potential for indirect impacts associated with habitat loss, no individual or population-level effects would be expected.	Future non–offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss and could result in injury or mortality of individuals.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis during onshore activities.
Light: Vessels	Ocean vessels have an array of lights, including navigational lights, deck lights, and interior lights. Bats could demonstrate attraction to or avoidance of construction vessels installing offshore facilities, particularly if insects (i.e., prey) are drawn to the lights of the vessels. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected.	No future activities were identified within the bats geographic analysis area other than ongoing activities.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Light: Structures	Buoys, towers, and onshore structures with lights could attract bats. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast but minimal offshore.	Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.5.1.1 for analysis.	See Sections 3.5.2.2 and 3.5.2.3 for analysis.
Climate change: Warming and sea level rise, storm severity/frequency	Storms during breeding and roosting season could reduce productivity and increase mortality. Intensity of this impact is speculative.	No future activities were identified within the bats geographic analysis area other than ongoing activities.		Climate change, including increased storm severity/frequency and increased disease frequency, could impact bats. However, the intensity and extent of these potential impacts are speculative at this time; therefore, climate change is not discussed further in the context of potential impacts to bats.
Climate change: Warming and sea level rise, increased disease frequency	Disease can weaken, lower reproductive output, and/or kill individuals. Some tropical diseases would move northward. Extent and intensity of this impact is highly speculative.	No future activities were identified within the bats geographic analysis area other than ongoing activities.		Climate change, including increased storm severity/frequency and increased disease frequency, could impact bats. However, the intensity and extent of these potential impacts are speculative at this time; therefore, climate change is not discussed further in the context of potential impacts to bats.

Birds

Table E1-3. Summary of Activities and the Associated Impact-Producing Factors for Birds

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Ingestion of hydrocarbons can lead to morbidity and mortality due to decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in feather oiling can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities, including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.	See Table E1-4 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the potential risk of accidental releases and associated impacts, including mortality, decreased fitness, and health effects on individuals. Impacts are unlikely to affect populations.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
Accidental releases: Trash and debris	Trash and debris are accidentally discharged through onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation, navigation, and traffic; survey activities; and cable, line, and pipeline laying on an ongoing basis. In a study from 2010, students at sea collected more	As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. This could result in increased injury or mortality of individuals. However, there does not appear	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
	than 520,000 bits of plastic debris per square mile. In addition, many fragments come from consumer products blown out of landfills or tossed out as litter. (Law et al. 2010). Birds could accidentally ingest trash mistaken for prey. Mortality is typically a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019).	to be evidence that the volumes and extents would have any impact on bird populations.		
Light: Vessels	Ocean vessels have an array of lights, including navigational lights, deck lights, and interior lights. Such lights can attract some birds. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected.	Gradually increasing vessel traffic over the next 35 years would increase the potential for bird and vessel interactions. While birds could be attracted to vessel lights, this attraction would not be expected to result in increased risk of collision with vessels. No population-level impacts would be expected.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Light: Structures	Buoys, towers, and onshore structures with lights can attract birds. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast but minimal offshore.	Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
New cable emplacement/ maintenance	Cable emplacement and maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be temporary and generally limited to the emplacement corridor. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be temporary and limited to the emplacement corridor. Suspended sediment could impair the vision of diving birds that are foraging in the water column (Cook and Burton 2010). However, given the localized nature of the potential impacts, individuals would be expected to successfully forage in nearby areas not affected by increased sedimentation, and no biologically significant impacts on individuals or populations would be expected.	Future new cables, would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized, short-term impacts. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for birds. With the possible exception of rescue operations and survey aircraft, no ongoing aircraft flights would occur at altitudes that would elicit a response from birds. If flights are at a sufficiently low altitude, birds could flush, resulting in nonbiologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary, and impacts would be expected to dissipate once the aircraft has left the area.	Aircraft noise is likely to continue to increase as commercial air traffic increases; however, very few flights would be expected to be at a sufficiently low altitude to elicit a response from birds. If flights are at a sufficiently low altitude, birds could flush, resulting in nonbiologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around	Same as ongoing activities, with the addition of possible future oil and gas surveys.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
	sites of investigation. These activities could result in diving birds leaving the local area. Non-diving birds would be unaffected. Any displacement would only be temporary during non-migratory periods, but impacts could be greater if displacement were to occur in preferred feeding areas during seasonal migration periods.			
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water could result in intermittent, temporary, localized impacts on diving birds due to displacement from foraging areas if birds are present in the vicinity of pile-driving activity. The extent of these impacts depends on pile size, hammer energy, and local acoustic conditions. No biologically significant impacts on individuals or populations would be expected.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Noise: Onshore construction	Onshore construction is routinely used in generic infrastructure projects. Equipment could cause displacement. Any displacement would only be temporary, and no individual fitness or population-level impacts would be expected.	Onshore construction would continue at current trends. Some behavior responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected.	See Section 3.7.1.1 for analysis during onshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during onshore activities.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub-surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to noise from G&G but likely less because noise levels are lower.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Presence of structures: Entanglement, gear loss, gear damage	Each year, 2,551 seabirds die annually from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets). In addition, recreational fishing gear (hooks and lines) is periodically lost on existing buoys, pilings, hard protection, and other structures and has the potential to entangle birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various hard protections atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these objects. These impacts are local and can be short term to permanent. These fish aggregations can provide localized, short-term to permanent beneficial impacts to some bird species because they could increase prey species availability.	New cables, installed incrementally in the geographic analysis area for birds over the next 20 to 35 years would likely require hard protection atop portions of the cables (see New cable emplacement/maintenance row above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes could increase. These impacts are expected to be local and could be short term to permanent. These fish aggregations can provide localized short-term to permanent beneficial impacts on	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
		some bird species due to increased prey species availability.		
Presence of structures: Migration disturbances	A few structures could be scattered about the offshore geographic analysis area for birds, such as navigation and weather buoys and light towers (NOAA 2020a). Migrating birds could easily fly around or over these sparsely distributed structures.	The infrequent installation of future new structures in the marine or onshore environment over the next 35 years would not be expected to result in migration disturbances.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Presence of structures: Turbine strikes, displacement, and attraction	A few structures could be in the offshore geographic analysis area for birds, such as navigation and weather buoys, turbines, and light towers (NOAA 2020a). Given the limited number of structures currently in the geographic analysis area, individual and population-level impacts due to displacement from current foraging habitat would not be expected. Stationary structures in the offshore environment would not be expected to pose a collision risk to birds. Some birds like cormorants and gulls could be attracted to these structures and opportunistically roost on these structures.	The installation of future new structures in the marine or onshore environment over the next 35 years would not be expected to result in an increase in collision risk or displacement. Some potential for attraction and opportunistic roosting exists but would be expected to be limited given the anticipated number of structures.	See Section 3.7.1.1 for analysis during offshore activities.	See Sections 3.7.2.2 and 3.7.2.3 for analysis during offshore activities.
Traffic	General aviation accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Additionally, aircraft are used for scientific and academic surveys in marine environments.	Bird fatalities associated with general aviation would be expected to increase and follow the current trend in commercial air travel. Aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. These flights would be well below 100,000 flights, and no bird strikes would be expected to occur.	Aircraft flying at low altitudes and vehicle traffic could cause birds to flush, resulting in increased energy expenditure. Disturbance to birds, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. General aircraft traffic accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Because aircraft flights associated with offshore wind development would be minimal in comparison to baseline conditions, aircraft strikes with birds are rare. For this reason, aircraft traffic would not be expected to contribute to overall impacts on birds and as a result, BOEM expects no measurable impacts to birds from aircraft traffic. Planned future offshore projects, specifically wind projects, would result in increased short-term construction vessel traffic and long-term maintenance vessel traffic. Some of the vessel traffic from planned future projects would use designated shipping channels. Vessel traffic could cause seabirds to flush, resulting in temporary habitat loss (Schwemmer et al. 2011). Avoidance of shipping channels could result in long-term habitat loss and fragmentation; however, these adverse impacts would be short-term **negligible** as birds would become habituated to channeled traffic.	**Offshore:** Helicopters could be used for crew changes and construction support during installation of the WTGs; however, their use would be infrequent and used during foundation construction (see COP Appendix T [Tech Environmental 2021]). Vessel traffic associated with construction activities could flush birds in the path of vessels, causing temporary displacement from the area; however, impacts would be temporary and similar to baseline conditions because vessel traffic already occurs, resulting in similar temporary displacement of birds in the geographic analysis area (Stantec 2018). The expected adverse impacts of aircraft and vessel traffic associated with the Proposed Action alone would not increase the impacts of this IPF beyond the impacts described under the No Action Alternative. Alternatives C through F would reduce the number of WTGs installed, potentially resulting in a reduced number of helicopter trips and vessel traffic required during construction. However, no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated. Therefore, impacts under Alternatives B through F are expected to be short term **negligible** adverse. A hoist-equipped helicopter could be used to support O&M of the RWF; however, helicopter use would be infrequent (see COP Appendix T [Tech Environmental 2021]). Increases in vessel traffic during maintenance activities would be limited and infrequent. The expected adverse impacts to birds from aircraft and vessel traffic associated with Alternatives B through F alone would not increase the impacts of this IPF beyond the impacts

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
				described under the No Action Alternative: short term **negligible** adverse. Aircraft flights associated with Project activities would be infrequent, and aircraft strikes with birds would be rare. Aircraft flights associated with other past, present, and reasonably foreseeable activities passing through the Lease Area would be minimal and infrequent. Vessel traffic could cause birds to flush, resulting in a temporary loss of habitat during construction activities associated with all Project alternatives. Impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, impacts would be temporary and similar to baseline conditions because vessel traffic already occurs in the geographic analysis area (Stantec 2018) and birds are habituated to regularly used shipping channels. In the context of reasonably foreseeable environmental trends, the combined aircraft and vessel traffic impacts from ongoing and planned actions, including Alternatives B through F, would be similar to the impacts under the No Action Alternative: long term **negligible** adverse.
				Onshore: Aircraft traffic would not have an onshore impact on birds. Therefore, impacts would be **negligible** adverse under all alternatives.
Climate change: Warming and sea level rise, storm severity/frequency, altered habitat/ecology	Increased storm frequency and severity during the breeding season can reduce productivity of bird nesting colonies and kill adults, eggs, and chicks. Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the distribution of bird prey resources.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
Climate change: Ocean acidification	Increasing ocean acidification could affect prey species upon which some birds feed and could lead to shifts in prey distribution and abundance. Intensity of impacts on birds is speculative.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.
Climate change: Warming and sea level rise, altered migration patterns	Birds rely on cues from the weather to start migration. Wind direction and speed influence the amount of energy used during migration. For nocturnal migrants, wind assistance is projected to increase across eastern portions of the continent (0.32 m/s; 9.6%) during spring migration by 2091, and wind assistance is projected to decrease within eastern portions of the continent (0.17 m/s; 6.6%) during autumn migration (La Sorte et al. 2018).	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/ Extent	Action Alternatives B through F
Climate change: Warming and sea level rise, increased disease frequency	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 35 years, influencing the frequencies and distributions of various diseases of birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.	See Section 3.7.1.1 for analysis.	See Sections 3.7.2.2 and 3.7.2.3 for analysis.

Water Quality

No IPFs with solely negligible impacts were identified.

Table E1-4. Summary of Activities and the Associated Impact-Producing Factors for Water Quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/ hazmat	Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable, line, and pipeline laying activities. According to the Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. Impacts are unlikely to affect water quality.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.
Accidental releases: Trash and debris	Trash and debris could be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, and cable, line, and pipeline laying. Accidental releases of trash and debris are expected to be low probability events. BOEM assumes operator compliance with federal and international requirements for management of shipboard trash; such events also have a relatively limited spatial impact.	As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. However, there does not appear to be evidence that the volumes and extents anticipated would have any effect on water quality.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Anchoring	Impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities.	Impacts from anchoring could occur semiregularly over the next 35 years due to offshore military operations or survey activities. These impacts would include increased seafloor disturbance resulting in increased turbidity levels. All impacts would be localized, short term, and temporary.	See Section 3.21.1.1.1 for analysis within offshore waters. Anchoring would not impact onshore waters.	See Sections 3.21.2.2 and 3.21.2.3 for analysis within offshore waters. Anchoring would not impact onshore waters.
New cable emplacement/ maintenance	Elevated suspended sediment concentrations can occur under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities and new cable and pipeline laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be short term and either be limited to the emplacement corridor or localized.	Suspension of sediments could continue to occur infrequently over the next 35 years due to survey activities and submarine cable, line, and pipeline-laying activities. Future new cables would occasionally disturb the seafloor and cause short-term increases in turbidity and minor alterations in localized currents resulting in local short-term impacts. The FCC has two pending submarine telecommunication cable applications in the North Atlantic. If the cable routes enter the water quality geographic analysis area, short-term disturbance in the form of increased suspended sediment and turbidity would be expected.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.
Port utilization: Expansion	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications, which, along with additional vessel traffic, could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future.	The general trend along the coastal region from Virginia to Maine is that port activity would increase modestly over the next 35 years. Port modifications and channel-deepening activities are being undertaken to accommodate the increase in vessel traffic and deeper draft vessels that transit the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.
Presence of structures	The installation of onshore and offshore structures leads to alteration of local water currents. These disturbances would be local but, depending on the hydrologic conditions, have the potential to impact water quality through the formation of sediment plumes.	Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Discharges	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North Atlantic and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has established dredge spoil criteria and regulate the disposal permits issued by the USACE. The impact on water quality from sediment suspension during these future activities would be short term and localized.	See Sections 3.21.1.1.1 and 3.21.1.2.1 for analysis.	See Sections 3.21.2.2 and 3.21.2.3 for analysis.

Coastal Habitats and Fauna

Table E2-1. Summary of Activities and the Associated Impact-Producing Factors for Coastal Habitats and Fauna

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
New cable emplacement/ maintenance	Onshore buried transmission cables are present in the area near the Project onshore and offshore improvements. Onshore activities would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, transportation infrastructure, sewer infrastructure, and cell tower projects could permanently convert various areas.	No known proposed onshore structures are reasonably foreseeable and proposed to be located in the geographic analysis area for coastal habitats and fauna.	A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small, if any, amounts of coastal habitat removal and would likely occur in previously disturbed areas. Habitat loss occurs when an area supporting wildlife is converted to non-habitat that lacks the natural resources to support occupancy for any species, such as paved areas. Short-term and temporary impacts associated with habitat loss or avoidance during construction could occur, and injury or mortality of individuals could occur. For this reason, land disturbance associated with onshore construction activities would have a **negligible** contribution to overall adverse impacts on coastal habitats and fauna.	**Onshore**: During construction of the onshore transmission cable and associated activities within the landfall work area, land disturbance could result in small temporary impacts (e.g., displacement and potential injury and/or mortality of individuals) on coastal fauna. Land disturbance and subsequent habitat removal or alteration could result from the RWEC connection to the landfall work area and construction of the onshore transmission cable. Potential indirect impacts to coastal habitats would include the spread of invasive species, reduction in habitat quality, and displacement of wildlife and resources based on changes to habitat conditions. The potential for onshore construction and habitat alteration to significantly affect coastal habitat is limited because the landfall work area consists of areas of predominately human-made shoreline and grassland/shrubland areas as a result of previous human activity. Habitat conversion is not a factor for developed areas (e.g., existing buildings, mowed lawns, parking lots, roads) within the landfall envelope. The construction period for the onshore facilities would occur over approximately 18 months, and the infrastructure at the landfall work area would be placed underground when completed. HDD would be employed to connect the RWEC and the landfall work area. This would limit or completely avoid direct impacts to the human-made shoreline and ruderal grassland/shrubland because the RWEC would be installed under these resources. The temporary onshore

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				construction work area for the HDD operations would likely be situated within a previously developed area (e.g., an existing parking lot) and would not impact the human-made shoreline and/or the ruderal grassland/shrubland. However, if these habitat types are disturbed, these impacts would be short term because the area would be reseeded to re-establish previous conditions. The human-made shoreline does not support any vegetative growth. A potential indirect impact to coastal habitat from onshore construction and habitat alteration linked to construction of the landfall work area is habitat degradation via the spread of invasive species. If vegetative clearing is required within the ruderal grassland/shrubland for construction of the landfall work area, then this could provide an opportunity for invasive plant species to outcompete native plants. The baseline conditions of the ruderal grassland/shrubland habitat already support a high occurrence of invasive plant species. Habitats with high levels of invasive species can degrade habitat quality for wildlife by reducing the amount of native plant material available for foraging. However, this area of undisturbed habitat is so small it is unlikely to provide a significant habitat resource to wildlife. The spread of invasive species would be managed in compliance with state and federal regulations. Impacts to coastal habitats and fauna from construction activities at the landfall work area would be considered short-term **negligible** adverse for Alternatives B through F. As noted within the landfall work area impact assessment, wildlife species subject to direct mortality during construction of the onshore facilities are those with limited or no mobility. Onshore transmission cable installation would result in temporary ground disturbance, but permanent disturbances are not anticipated. Most of the temporary ground disturbance would be from a trench that would follow along paved roads or previously disturbed areas (e.g., parking lots) except for a small portion that intersects approximately 0.02 acre of plantation and ruderal forest. The onshore transmission cable would be up to 1 mile long with a maximum temporary disturbance corridor of 25 feet (30 feet at splice vaults) and a maximum disturbance depth of 10 feet that would be mostly limited to established road ROWs or previously disturbed areas such as parking lots with little to no impact to adjacent coastal and terrestrial habitat. Where the onshore transmission cable would connect to the OnSS, it would be installed below a proposed access driveway. Some of the alternative routes under consideration within the

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				transmission cable envelope contain segments that would pass through undeveloped, vegetated areas. If selected, these routes would require vegetative clearing and would be maintained as managed lawn and or gravel access road to maintain access to the cable infrastructure belowground. Since these segments of the onshore transmission cable routes under consideration would be installed within previously undeveloped areas, the impacts resulting from habitat alteration and conversion would be considered long term and **negligible**. Regular O&M activities would not cause further habitat alteration or impact coastal habitats and fauna. However, when cable inspection or repairs require excavation, this nonroutine maintenance could cause limited land disturbance to create access to the infrastructure. Such occurrences are expected to be infrequent and would result in localized and short-term **negligible** adverse impacts to coastal habitats and fauna for Alternatives B through F. Decommissioning of the onshore transmission cable would have similar impacts on coastal habitats and fauna to those described for the construction phase if the underground infrastructure is removed. If the infrastructure is abandoned in place, it would not have any impacts. Construction and installation, O&M, and decommissioning of the onshore transmission cable under all Project alternatives would incrementally contribute to the habitat conversion and habitat loss described under the No Action Alternative. Because of the small amount of affected onshore habitat, land disturbance from Alternatives B through F when added to other past, present, and reasonably foreseeable projects would result in **negligible** adverse incremental impacts to coastal habitats and fauna.
Presence of structures	Periodic clearing of shrubs and tree saplings along existing utility ROWs causes disturbance and temporary displacement of mobile species and could cause direct injury or mortality of less mobile species, resulting in short-term impacts that are less than noticeable. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, and cell tower projects also causes disturbance, displacement, and potential injury and/or mortality of fauna, resulting in small temporary impacts.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.8.1.1 for analysis.	See Sections 3.8.2.2 and 3.8.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.
Noise: Onshore/offshore construction	Ongoing noise from construction occurs frequently near shores of populated areas in New England and the mid-Atlantic region but infrequently offshore. Noise from construction near shorelines is expected to gradually	No future activities were identified within the geographic analysis area other than ongoing activities.	Onshore construction noise has the potential to have a **negligible** adverse impact on coastal fauna. BOEM anticipates that these impacts would be temporary and highly localized. Habitat-related impacts (i.e.,	**Onshore:** Another potential indirect impact to coastal fauna during construction of the onshore facilities is displacement or avoidance behavior of individuals due to noise. The overall installation schedule for onshore

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	increase over the next 30 years, in line with human population growth along the coast of the geographic analysis area. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary.		displacement from potentially suitable habitats) could occur as a result of construction activities. These impacts would likely be limited to temporary behavioral avoidance, and no permanent impacts would be expected. Given the temporary and localized nature of potential impacts, and the current level of development within the geographic analysis area, no individual fitness or population-level impacts would occur as a result of noise associated with onshore construction activities.	facilities is expected to be approximately 1 year (see COP Section 3.2, Project Schedule). Construction would typically result in temporary increases in noise. As described in vhb's onshore acoustic assessment (vhb 2020), noise was evaluated based generally on the noisiest condition when the loudest construction equipment would be in operation. The primary noise sources generated during construction would be from increased traffic volumes (i.e., delivery trucks carrying construction equipment and supplies and automobiles used for daily commuting to various work sites) and HDD at the landfall work area. Sound-generating construction equipment associated with HDD operations would include a drill rig, a generator, and mud pumps. Unlike most other construction activities that can be limited to daytime hours, it is typically necessary for HDD operations to occur continuously to minimize the risk of soil settlement and equipment failures. Other noise-generating equipment used during HDD operations would include an excavator, a crane, and either an impact or vibratory sheet pile driver for site preparation. The onshore acoustic assessment (vhb 2020) indicates that construction equipment used to support construction of the landfall work area could create sound levels that range from 56 to 101 dBA at 50 feet from the noise source. Ambient sound measurements conducted within the analysis area under existing conditions ranged from 44 to 45 dBA (Leq) at night and 49 to 50 dBA during the day (vhb 2020). Construction of the onshore transmission cable would involve different construction phases, each using noise-generating equipment such as bulldozers, backhoes, front-end loaders, aerial lifts, trenchers, compactors, concrete saws, graders, pumps, compressors, and trucks. Because the onshore transmission cable installation process would progress along the cable route during this period, the exposure to construction noise would be limited to a discrete duration at any location along the route. The onshore acoustic assessment (vhb 2020) indicates that construction equipment used to support construction of the onshore transmission cable could create sound levels that range from 73 to 90 dBA at 50 feet from the noise source depending on the installation methodology. The sequence for construction of the OnSS and ICF would typically include clearing the site of vegetation, grading the site, installing environmental erosion controls, installing the foundations and erecting buildings for housing equipment, and restoring any disturbed areas on the site and removing environmental controls. The types of construction equipment used would generally include

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				backhoes, cranes, refrigerator units, front-end loaders, and generators. The onshore acoustic assessment (vhb 2020) indicates that construction equipment used to support construction of the OnSS could create sound levels that range from 80 to 85 dBA at 50 feet from the noise source. Potential impacts to coastal fauna from the temporary increase in construction-generated noise could include avoidance behavior and displacement during the construction period (Brown et al. 2012). Because the construction period is temporary, noise impacts on wildlife species during construction of the onshore facilities of Alternatives B through F are expected to be temporary negligible adverse. No impacts related to noise would be expected from operation of the onshore transmission cable because the infrastructure would be underground. However, when cable inspection or repairs require excavation, this non-routine maintenance could generate equipment- and vehicle-related noise. Such occurrences are expected to be infrequent and would result in localized and short-term negligible adverse impacts to coastal habitats and fauna. Decommissioning of the onshore transmission cable would have similar impacts from noise on coastal habitats and fauna to those described for the construction phase if the underground infrastructure is removed. If the infrastructure is abandoned in place, it would not have any impacts. O&M at the proposed OnSS and ICF would introduce new sources of sound, including transformers, shunt reactors, harmonic filters, cooling and ventilation associated with the outdoor substation equipment as well as condensers, pumps, skids, and auxiliary transformers associated with the synchronous condenser building. Operational sound from the OnSS and ICF is modeled to be 45.5 dBA (Leq) or less when measured at the nearest anthropogenic noise sensitive receivers, which would fall within the ambient sound range measured at baseline conditions (44 to 45 dBA (Leq) at night and 49 to 50 dBA during the day) (vhb 2020), and no impacts to coastal fauna are expected. Temporary noise could occasionally be generated during non-routine maintenance at all onshore facilities. Infrequent vehicle usage within the OnSS and ICF could create temporary disturbance to wildlife adjacent to the OnSS, but such disturbance would be short term, and normal wildlife activity would likely resume after the traffic ceases. Impacts from noise during decommissioning of onshore facilities would be similar to those during

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				construction: temporary negligible adverse for all Project alternatives. Construction, O&M, and decommissioning of the onshore facilities would also produce temporary noise that would lead to short-term negligible incremental impacts, if any, on coastal habitats and fauna. The onshore elements of Alternatives B through F would be in already developed areas with existing noise disturbance where wildlife is habituated to human activity. Therefore, the cumulative impact of noise generated by Alternatives B through F on coastal habitats and fauna when combined with past, present, and reasonably foreseeable projects would be localized and short term **negligible** adverse.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by GHG emissions, is altering the seasonal timing and patterns of species distributions and ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 35 years.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.8.1.1 for analysis.	See Sections 3.8.2.2 and 3.8.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.

Wetlands and Other Waters of the United States

Table E2-2. Summary of Activities and the Associated Impact-Producing Factors for Wetlands and Other Waters of the United States

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release.	No future activities were identified within the geographic analysis area for wetlands and other WOTUS other than ongoing activities.	See Section 3.22.1.1 for analysis.	See Sections 3.22.2.2 and 3.22.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occur from onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying.	No future activities were identified within the geographic analysis area for wetlands and other WOTUS other than ongoing activities.	See Section 3.22.1.1 for analysis.	See Sections 3.22.2.2 and 3.22.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.
Discharges	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to the prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased future coastal development has potential to cause increased nutrient pollution in communities, approximately 80% of which is due to groundwater contamination by septic systems. In addition, ocean disposal activity in the North Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has established dredge spoil criteria and regulates the disposal permits issued by the USACE.	See Section 3.22.1.1 for analysis.	See Sections 3.22.2.2 and 3.22.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
New cable emplacement/ maintenance	No known proposed cables are reasonably foreseeable and proposed to be located in the geographic analysis area for wetlands and other waters of the United States.	Any new cable or pipeline installed in the geographic analysis area would likely require hard protection atop portions of the route. Such protection is anticipated to increase incrementally over the next 30 years.	See Section 3.22.1.1 for analysis.	See Sections 3.22.2.2 and 3.22.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.
Presence of structures	Ongoing development of onshore properties, especially shoreline parcels, periodically could lead to unvegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity. No known proposed structures are reasonably foreseeable and proposed to be located in the geographic analysis area for wetlands and other WOTUS.	Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance and ongoing development. This sediment suspension would lead to short-term and localized impacts.	See Section 3.22.1.1 for analysis.	See Sections 3.22.2.2 and 3.22.2.3 for analysis of onshore impacts. The IPF would not impact offshore resources.
Sediment deposition and burial	Ongoing cable or structure maintenance activities can infrequently disturb sediments; these disturbances are local and limited to the emplacement corridor. Precipitation events could potentially mobilize the disturbed sediments into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	No future activities were identified within the geographic analysis area other than ongoing activities.	Dredge materials from future offshore wind activities would not be disposed of in areas with wetlands or other WOTUS within the geographic analysis area. Therefore, **negligible** adverse impacts to wetlands and other WOTUS within the geographic analysis area are anticipated.	Dredge materials from Project activities would not be disposed of in areas with wetlands or other WOTUS. Therefore, sediment deposition and burial impacts on wetlands and other WOTUS from construction and installation would be the same for Alternatives B through F: **negligible** adverse. O&M of onshore O&M facilities could include dredging activities for Alternatives B through F; however, materials from O&M activities would not be disposed of in areas with wetlands or other WOTUS. Therefore, **negligible** adverse impacts to wetlands and other WOTUS from sediment deposition and burial are anticipated for all Project alternatives. Dredge materials from Alternatives B through F and other future offshore wind projects within the geographic analysis area would not be disposed of in areas with wetlands or other WOTUS. As a result, when combined with past, present, and reasonably foreseeable projects, Alternatives B through F are expected to result in **negligible** adverse impacts to wetlands and other WOTUS.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to a widespread loss of shoreline habitat from rising seas and erosion. In submerged habitats, warming is altering ecological relationships and the distributions of ecosystem engineer species, likely causing permanent changes of unknown intensity gradually over the next 3 years.	No future activities were identified within the geographic analysis area other than ongoing activities.	Impacts of climate change, including increased storm severity and frequency, are ongoing stressors for wetlands and other WOTUS. Future offshore wind projects aim to combat climate change and associated effects by reducing GHG emissions. Under the No Action Alternative, the long-term net decrease in GHG emissions from other ongoing and future offshore wind and other non-fossil fuel–based energy generation projects would be slightly less than with the Proposed Action. As a result, the effects to wetlands and other WOTUS would be **negligible** to **minor** adverse, as they are anticipated to occur but have no measurable influence within the geographic analysis area.	Air pollutants could impact onshore biological resources, including wetlands and WOTUS. Acidification of soils, lakes, and streams could result in changes in community structure and biodiversity within these habitats. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. Specifically, EPA requires modeling of NAAQS and Class I significant impact levels for the purpose of PSD permitting for the construction and operation of Revolution Wind. Compliance with the NAAQS offshore in and near the Lease Area will be evaluated with air quality dispersion modeling through EPAs OCS permitting. Because air emissions generated during the construction and installation period would not exceed applicable air

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				emission standards the impacts to onshore wetlands and other WOTUS would be short-term negligible adverse. Air emissions generated during O&M of onshore facilities would be less than 1% of the counties' annual emissions (see Section 3.4.2.2.2). While cumulative air emissions in the region would increase during construction, it is important to note that the Proposed Action could also contribute to a long-term net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. Therefore, impacts to wetlands and other WOTUS are anticipated to be **negligible** adverse. The cumulative impacts from global climate change would be the same as those described for future offshore wind activities without the Proposed Action because emissions from other past, present, and reasonably foreseeable projects, in combination with air emissions generated during construction and O&M would not exceed applicable air emission standards. Thus, potential impacts to wetlands and other WOTUS from the incremental contribution to climate change attributed to the Proposed Action when combined with past, present, and other reasonably foreseeable projects are uncertain but are anticipated to qualify as long term **negligible** adverse. Alternatives C through F would have the same onshore activities and facilities as the Proposed Action; therefore, climate change impacts on wetlands and other WOTUS would be the same as those described for the Proposed Action: **negligible** adverse.

Benthic Habitat and Invertebrates

Table E2-3. Summary of Activities and the Associated Impact-Producing Factors for Benthic Habitat and Invertebrates

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a discussion of ongoing accidental releases. Accidental releases of hazmat occur periodically, mostly consisting of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they rarely contact benthic resources. The chemicals with potential to sink or dissolve rapidly often dilute to nontoxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable. Impacts, including mortality and decreased fitness, are localized and temporary and rarely affect invertebrate populations.	Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Impacts are unlikely to affect invertebrate populations. See previous table cell and Table E1-4 on water quality for details.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.3 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors but can be noticeable, widespread, and permanent.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.3 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occurs from onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.3 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Anchoring	Regular vessel anchoring related to ongoing military, survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and the potential for direct contact to cause injury and mortality of benthic resources as well as physical damage to their habitats. These impacts are greatest for sessile or slow-moving species (e.g., corals, sponges, and sedentary shellfish). All impacts are localized; turbidity is temporary; injury and mortality are recovered in the short term; and physical damage can be permanent if it occurs in eelgrass beds or hard-bottom habitat.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Bycatch	Bycatch occurs in various gillnet and trawl fisheries in New England and the mid-Atlantic coast, with hotspots driven by fishing intensity (Lewison et al. 2014; NMFS 2018a).	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
EMFs	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the geographic analysis area. Some benthic species can detect EMFs, although EMFs do not appear to present a barrier to movement. The extent of impacts (behavioral changes) is likely less than 50 feet (15.2 m) from the cable and the intensity of impacts on benthic resources is likely undetectable.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Light: Vessels	Marine vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract invertebrates, potentially affecting distributions in	See table cell to the left.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts.		measurable effect on benthic habitat or invertebrates and are not analyzed.	measurable effect on benthic habitat or invertebrates and are not analyzed.
Light: Structures	Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract invertebrates, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
New cable emplacement/ maintenance	Cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill benthic resources and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPFs of seafloor profile alterations and sediment deposition and burial.)	Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts. The FCC has two pending submarine telecommunication cable applications in the North Atlantic. If the cable routes enter the geographic analysis area for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Noise: Aircraft	Noise from aircraft reaches the sea surface on a regular basis. However, there is not likely to be any impact of aircraft noise on benthic habitat and invertebrates, as very little of the aircraft noise propagates through the water.	Aircraft noise is likely to continue to increase as commercial air traffic increases. However, there is not likely to be any impact of aircraft noise on benthic habitat and invertebrates.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Noise: Onshore/offshore construction	Noise from construction occurs frequently in the nearshores of populated areas in New England and the mid-Atlantic region but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources. See also sub-IPF for Noise: Pile driving.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less intense sound waves more similar to common deep-water echosounders. The	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
		intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.		
Noise: O&M	Some invertebrates could be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low-frequency noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015), sound pressure levels would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 m]) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts.	New or expanded marine minerals extraction and commercial fisheries could intermittently increase noise during their O&M over the next 35 years. Impacts would likely be small and local.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can cause injury and/or mortality to benthic resources in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Hawkins and Popper 2017; Weilgart 2018). The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 to 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 35 years, local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase could require port modifications, leading to local impacts.	**Offshore:** The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Activities like dredging and the expansion or development of new overwater structures could lead to adverse effects on coastal and estuarine benthic habitats and invertebrates or benthic resources. However, any such impacts would be outside the geographic analysis area for benthic habitat and the nature and extent of these impacts on invertebrates cannot currently be quantified as no specific port improvement activities have	**Offshore:** Several regional ports could be used during Project construction and decommissioning, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could include activities like dredging and the development of new overwater structures that could adversely affect benthic resources or invertebrates within the geographic analysis

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
		Future channel-deepening activities would likely be undertaken. Existing ports have already affected benthic resources and invertebrates, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts would likely be undetectable outside the immediate vicinity of the ports, adverse impacts for certain species and/or life stages could lead to impacts on benthic resources and invertebrates beyond the vicinity of the port.	been proposed. Therefore, these activities would have a **negligible** adverse impact on benthic resources and invertebrates. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects.	area, but no specific improvements are included in Alternatives B through F. Any future port expansion incentivized by the Project would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. Therefore, these localized and cumulative habitat impacts would have **a negligible** adverse effect on benthic habitats or marine invertebrates during Project construction, O&M, and decommissioning.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small short-term, localized impacts.	Future new cables would present additional risk of gear loss, resulting in small short-term, localized impacts (disturbance, injury).	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Presence of structures: Hydrodynamic disturbance	Human-made structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on benthic resources and invertebrates are typically undetectable. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.	Tall vertical structures can increase seafloor scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are local and permanent.	New cables installed in the geographic analysis area over the next 35 years would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance row in this table). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat, sandy seascape. Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect populations and communities of benthic resources. These impacts are expected to be local and permanent as long as the structures remain.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously provide uncommon hard-bottom habitat. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Benthic species dependent on hard-bottom habitat and structure-oriented species thus benefit on a constant basis; however, the diversity could decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019: Chapter 7) and the new habitat can also be	Any new towers, buoy, piers, or cable protection structures would create uncommon relief in a mostly sandy seascape. Benthic species dependent on hard-bottom habitat could benefit, although the new habitat could also be colonized by invasive species (e.g., certain tunicate species), and the diversity could decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019: Chapter 7). Soft bottom is the dominant habitat type in the region, and species that rely	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	colonized by invasive species (e.g., certain tunicate species). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	on this habitat would not likely experience population-level impacts (Greene et al. 2010; Guida et al. 2017).		
Presence of structures: Migration disturbances	Human structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms) can attract invertebrates that approach the structures during their migrations. To date, BOEM has not identified any published evidence to suggest that human structures pose a barrier to, or slow, migratory invertebrates.	The infrequent installation of future new structures in the marine environment over the next 35 years could attract invertebrates that approach the structures during their migrations. This could slow migrations. Migratory animals would likely be able to proceed from structures unimpeded.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Presence of structures: Transmission cable infrastructure	The presence of transmission cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion.	See other sub-IPFs within Presence of structures rows.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Discharges	The gradually increasing amount of vessel traffic is increasing the cumulative permitted discharges from vessels. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. However, there does not appear to be evidence that the volumes and extents have any impact on benthic resources.	There is the potential for new ocean dumping/dredge disposal sites in the Northeast. Impacts (disturbance, reduction in fitness) of infrequent ocean disposal to benthic resources are short term because spoils are typically recolonized naturally. In addition, the EPA has established dredge spoil criteria and it regulates the disposal permits issued by the USACE; these discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor. Sediment deposition could have adverse impacts on some benthic resources, especially eggs and larvae, including smothering and loss of fitness—particularly demersal eggs such as longfin squid, which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts could vary based on season/time of year. Where dredged materials are disposed, benthic resources are smothered. However, such areas are typically recolonized naturally in the short term. Most sediment dredging projects have time-of-year restrictions to minimize impacts on benthic resources. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	The USACE and/or private ports could undertake dredging projects periodically. Where dredged materials are disposed, benthic resources are buried. However, such areas are typically recolonized naturally in the short term. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Vessel traffic	While ongoing vessel activity could have some effect on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly	**Offshore:** Construction and operational vessel traffic from future wind farm development and decommissioning would not be expected to measurably affect marine	**Offshore:** Construction, O&M, and decommissioning of vessel cooling systems could entrain planktonic eggs and larvae of fish and invertebrates, leading to injury or

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	increase over the next 30 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic.	invertebrates and benthic habitat structure and composition. Although construction and O&M of vessel cooling systems could entrain planktonic eggs and larvae of fish and invertebrates, leading to injury or mortality of some individuals, these effects are not expected to be measurable relative to natural mortality rates, which can range from 1 to 10% per day or higher (White et al. 2014). Therefore, these effects are unlikely to be significant at the population level. Vessel traffic would have no measurable effects on benthic habitat and benthic or pelagic invertebrates aside from underwater noise exposure and vessel anchoring, which are addressed separately above. Therefore, vessel traffic effects on benthic habitat and invertebrates from the construction, O&M, and decommissioning of planned and potential future offshore wind energy projects would be **negligible** adverse relative to baseline conditions in the affected environment.	mortality of individuals. However, these short-term effects are not expected to be measurable relative to natural mortality rates and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on invertebrates and benthic habitat would be **negligible** adverse for all Project alternatives and configurations. Although Alternatives C through F would decrease the total number of vessel trips and duration of vessel activity required for O&M and decommissioning relative to the Proposed Action, impacts would remain **negligible** adverse for all Project alternatives. The construction and O&M of all Project alternatives and other planned and potential future offshore wind energy projects would require the use of construction and operational vessels. This would increase the number of vessels operating in the invertebrate geographic analysis area for the foreseeable future. However, vessel-related entrainment mortality is unlikely to be significant at the population level for any invertebrate species. Therefore, vessel traffic cumulative effects on benthic habitat and invertebrates in combination with other planned and potential future offshore wind energy projects would be **negligible** adverse relative to baseline conditions in the affected environment.
Climate change: Ocean acidification	Ongoing CO_2 emissions causing ocean acidification could contribute to reduced growth or the decline of benthic invertebrates that have calcareous shells, as well as reefs and other habitats formed by shells, over the course of the next 35 years.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Climate change: Warming and sea level rise, altered habitat, ecology, and migration patterns	Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the distributions of benthic species and altering ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 35 years.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by ongoing GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of benthic species and likely causing permanent changes of unknown intensity over the next 35 years.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Sections 3.6.1.1.1 and 3.6.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.	See Sections 3.6.2.2 through 3.6.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat or invertebrates and are not analyzed.

Finfish and Essential Fish Habitat

Table E2-4. Summary of Activities and the Associated Impact-Producing Factors for Finfish and Essential Fish Habitat

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary and rarely affect populations.	See Table E1-4 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Impacts are unlikely to affect populations.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on finfish and EFH depend on many factors, but can be widespread and permanent.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Anchoring	Vessel anchoring related to ongoing military use and survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. Impacts on finfish and EFH are greatest for sensitive EFH (e.g., eelgrass, hard bottom) and slow-moving species.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for direct contact, causing mortality of benthic species and, possibly, degradation of sensitive habitats. All impacts would be localized; turbidity would be temporary; impacts from direct contact would be recovered in the short term. Degradation of sensitive habitats such as certain types of hard bottom (e.g., boulder piles), if it occurs, could be long term.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
EMFs	EMFs emanate continuously from installed telecommunication and electrical power transmission cables. Biologically significant impacts on finfish and EFH have not been documented for AC cables (CSA Ocean Sciences, Inc. and Exponent 2019; Thomsen et al. 2015), but behavioral impacts have been documented for benthic species (skates and lobster) near operating DC cables (Hutchison et al. 2018). The impacts are localized and affect the animals only while they are within the EMF. There is no evidence to indicate that EMF from undersea AC power cables negatively affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences, Inc. and Exponent 2019).	During operation, future new cables would produce EMF. (See table cell to the left.) Submarine power cables in the geographic analysis area for this resource are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap (even for multiple cables within a single export cable corridor). Although the EMF would exist as long as a cable was in operation, impacts, on finfish and EFH would likely be difficult to detect.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Light: Vessels	Marine vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract finfish, potentially affecting distributions in a highly	See table cell to the left.	Artificial light can attract finfish and can influence or disrupt biological functions (e.g., timing of cod spawning) (Rich and Longcore 2006) that are triggered by changes in daily and seasonal daylight cycles. Planned future activities include up to 3,008 offshore WTGs and OSS foundations. The construction and O&M of these structures would introduce new short-term and long-term	**Offshore:** Artificial lighting during construction, O&M, and decommissioning at the RWF would be associated with navigational and deck lighting on vessels from dusk to dawn. Lighting would be hooded and directed downward to avoid unnecessary illumination of the surrounding environment to the extent practicable. Reaction of finfish, including EFH species, to this artificial light is highly

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts.		sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on the structures, respectively. Orr et al. (2013) developed design and mitigation recommendations for reduction of biologically significant impacts from artificial light in offshore wind infrastructure. Based on these findings, BOEM (2021) has issued design guidance for avoiding and minimizing artificial lighting impacts from such activities and has concluded that adherence to these measures should effectively avoid adverse effects on fish. BOEM would require all future offshore energy projects to comply with this guidance. Given the minimal and localized nature of anticipated lighting impacts under this guidance, the related effects from proposed future activities on finfish and EFH in the geographic analysis area are likely to be **negligible** adverse.	species dependent and could include attraction and/or avoidance of the area. Artificial lighting could disrupt the migration patterns of fish, increase risk of predation and disrupt predator prey interactions, and alter species' richness and community composition in the affected area (Nightingale et al. 2006; Orr et al. 2013). However, these types of effects are most associated with bright permanent lights on nearshore and overwater structures. The Project would comply with BOEM (2021) issued design guidance for avoiding and minimizing artificial lighting impacts. Therefore, lighting effects on finfish and EFH would be short term to long-term **negligible** adverse for Alternatives B through F, with reduced impacts under Alternatives C through F due to a decrease in total duration of construction vessel activity. BOEM estimates a cumulative total of up to 3,110 offshore WTGs and OSS foundations for the Project plus all other future offshore wind projects in the finfish and EFH geographic analysis area. For reasons described in the preceding paragraph, the cumulative impacts associated with all Project alternatives when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse, mostly attributable to existing, ongoing activities.
Light: Structures	Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract finfish, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast but minimal offshore.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Light: Vessels for analysis.	See Light: Vessels for analysis of impacts.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are local and limited to the cable corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities disturb, displace, and injure finfish and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPF of Sediment deposition and burial.)	Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts. The FCC has two pending submarine telecommunications cable applications in the North Atlantic. If the cable routes enter the geographic analysis area for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Noise: Aircraft	Noise from aircraft reaches the sea surface on a regular basis. However, aircraft noise is not likely to impact finfish and EFH, as very little of the aircraft noise propagates through the water.	Aircraft noise is likely to continue to increase as commercial air traffic increases. However, aircraft noise is not likely to impact aircraft noise on finfish and EFH.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Noise: Onshore/Offshore construction	Noise from construction occurs frequently in nearshores of populated areas in New England and the mid-Atlantic region but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. See also sub-IPF for Noise: Pile driving.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Noise: G&G and scientific surveys	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb finfish in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to finfish in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Noise: O&M	Some finfish and invertebrates could be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low frequency noise barley exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015), sound pressure levels would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 m]) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts.	New or expanded marine minerals extraction and commercial fisheries could intermittently increase noise during their O&M over the next 35 years. Impacts would likely be small and local.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or the seafloor can cause injury and/or mortality to finfish in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of finfish and invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Hawkins and Popper 2017; Weilgart 2018). Potentially injurious noise could also be considered as rendering EFH temporarily unavailable or unsuitable for the duration of the noise. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Noise: Cable laying/ trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area for this resource. These disturbances would be infrequent over the next 35 years, temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Noise: Vessels	While ongoing vessel noise could have some effect on behavior and masking, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	See table cell to the left.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase could require port modifications, leading to local impacts. Future channel-deepening activities would likely be undertaken. Existing ports have already affected finfish and EFH, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts on EFH would likely be undetectable outside the immediate vicinity of the ports, adverse impacts on EFH for certain species and/or life stages could lead to impacts on finfish and EFH beyond the vicinity of the port.	The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Activities like dredging and the expansion or development of new overwater structures could lead to adverse effects on finfish, including EFH species, and coastal and estuarine habitats. Resulting effects on finfish would vary depending on the types of species and habitats present. However, the nature and extent of these impacts cannot currently be quantified as no specific port improvement activities have been proposed. All future port improvements would be subject to independent environmental permitting and regulatory review. Any resulting effects on finfish would be evaluated as part of those efforts. Therefore, impacts to finfish and EFH would be **negligible** adverse.	**Offshore:** Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could include activities like dredging and the development of new overwater structures that could adversely affect finfish and EFH within the geographic analysis area, but no specific improvements are included in Alternatives B through F. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. Therefore, Project-specific and cumulative port utilization impacts would be **negligible** adverse.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small localized, short- to long-term impacts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Presence of structures: Hydrodynamic disturbance	Human-made structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on finfish and EFH are typically undetectable. Indirect impacts of structures influencing primary	Tall vertical structures can increase seafloor scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.			
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. These impacts are local and often permanent. Fish aggregation could be considered adverse, beneficial, or neutral.	New cables, installed incrementally in the geographic analysis area for this resource over the next 20 to 35 years, would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance IPF). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes could increase. These impacts are local and could be permanent.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape, but there is some hard-bottom and/or complex habitat; structure-oriented species thus benefit on a constant basis. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	New cable, installed incrementally in the geographic analysis area over the next 20 to 35 years, would likely require hard protection atop portions of the route (see New cable emplacement/maintenance row). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres), and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Presence of structures: Migration disturbances	Human-made structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms), can attract finfish that approach the structures during their migrations. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Fabrizio et al. 2014; Moser and Shepherd 2009; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 35 years could attract finfish that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Fabrizio et al. 2014; Moser and Shepherd 2009; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded.	See Section 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Presence of structures: Transmission cable infrastructure	See other sub-IPFs within the Presence of structures IPF. See Table E2-1 on Coastal Habitats and Fauna.	See other sub-IPFs within the Presence of structures IPF	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor. Sediment deposition could have negative impacts on eggs and larvae, including smothering and loss of fitness. Impacts could vary based on season/time of year.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
Vessel traffic	Ongoing activities that contribute to this IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. However, no substantial changes are anticipated to existing vessel traffic volumes.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. Vessel traffic is expected to continue at or near current levels.	Construction and O&M vessel cooling systems could entrain planktonic fish eggs and larvae, leading to injury or mortality of some finfish, including EFH individuals. However, these effects are not expected to be measurable relative to natural mortality rates, which can range from 1 to 10% per day or higher (White et al. 2014) and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on finfish and EFH from the construction, O&M, and decommissioning of planned and potential future offshore wind energy projects would be **negligible** adverse relative to baseline conditions in the affected environment.	Vessels used for Project construction, O&M, and decommissioning could entrain planktonic finfish eggs and larvae in their cooling systems, leading to injury or mortality of individuals. However, these effects are not expected to be measurable relative to natural mortality rates and are therefore unlikely to be significant at the population level. Therefore, vessel traffic effects on finfish and EFH from Project construction, O&M, and decommissioning would be **negligible** adverse. The construction and O&M of Alternatives B through F and other planned and potential future offshore wind energy projects would require the use of construction and operational vessels. This would increase the number of vessels operating in the finfish and EFH geographic analysis area for the foreseeable future. While the number of vessels operating in the geographic analysis area is large, the number of individual eggs and larvae exposed to entrainment-related mortality effects from individual vessels is negligible relative to natural mortality rates. Therefore, vessel traffic cumulative effects on finfish and EFH from the construction, O&M, and decommissioning of Alternatives B through F in combination with other planned and potential future offshore wind energy projects would be **negligible** adverse relative to baseline conditions in the affected environment.
Climate change: Ocean acidification	Continuous carbon dioxide emissions causing ocean acidification could contribute to reduced growth or the decline of finfish and EFH over the course of the next 35 years.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Climate change: Warming and sea level rise, altered habitat/ ecology	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 35 years, influencing the distributions of finfish and EFH. This sub-IPF has been shown to affect the distribution of fish in the northeast United States, with several species shifting their centers of biomass either northward or to deeper waters (Hare et al. 2016).	See above.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Climate change: Warming and sea level rise, altered migration patterns	See above.	See above.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming	See above.	See Sections 3.13.1.1.1 and 3.13.1.2.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs	See Sections 3.13.2.2 through 3.13.2.5 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	of ocean waters over the next 35 years, influencing the frequencies of various diseases of finfish.		associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.	associated with onshore activities would have no measurable effect on finfish or EFH and are not analyzed.

Marine Mammals

Table E2-5. Summary of Activities and the Associated Impact-Producing Factors for Marine Mammals

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshida et al. 2017). Additionally, accidental releases could result in impacts on marine mammals due to effects to prey species (see Table E2-4).	Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases described for ongoing activities.	**Offshore:** BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Baulch and Perry (2014) identified ingested debris as the likely cause of mortality in 22% of beached marine mammal carcasses. Approximately 50% of marine mammal species worldwide have been documented ingesting marine litter (Werner et al. 2016). While development of future offshore wind facilities and associated marine vessels could be a source of accidental releases of trash and debris, BOEM and USCG requirements would effectively avoid and minimize impacts such that the resulting effects to marine mammals would be **negligible** adverse. BOEM also requires applicants to develop spill response and containment plans to quickly address accidental spills of fuels, lubricants, and other contaminants. A total of approximately 23 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and OSSs across all projected offshore wind projects along the Atlantic coast. A large spill of toxic materials (fuels, lubricants, and other contaminants) could potentially injure or kill several individual marine mammals and adversely affect habitat suitability and would require extensive mitigation to offset. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE. Oil spill response plans are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impact on affected resources. Given the low probability of a large spill event, impacts to marine mammals from this IPF are likely to be **negligible** adverse.	**Offshore:** Construction vessels and offshore structures pose a theoretical source of marine debris and entanglement risk and accidental discharges of petroleum products and other toxic substances. Marine debris is a known source of adverse effects to marine mammals (Laist 1997; NOAA-MDP 2014a, 2014b). Revolution Wind would follow strict oil spill prevention and response procedures during all Project phases; would comply with all debris and pollution requirements; and has developed a detailed spill response and containment plan as a Project EPM. These regulatory requirements and the EPM would effectively avoid releases of abandoned marine debris and would avoid and minimize impacts from accidental spills such that adverse effects on marine mammals are unlikely to occur. In the unlikely event that an accidental spill should occur, individual marine mammals could be injured or killed; habitat suitability could be adversely affected; and extensive mitigation would be required. However, due to the low likelihood of such an event, the temporary nature of the impacts, and established EPMs, effects on marine mammals from this impact mechanism would be **negligible** adverse for Alternatives B through F. Existing and planned future offshore wind-energy development could result in the accidental release of water quality contaminants or trash/debris, which could theoretically lead to an increase in debris and pollution in the marine mammal geographic analysis area (see Section 3.15.1.1 for characterization of existing marine pollution conditions). Compliance with debris and pollution requirements would effectively minimize releases of trash and debris. Given these restrictions, the risk to marine mammals from trash and debris from Alternatives B through F in combination with those from other planned and potential future activities is **negligible** adverse. Moreover, Alternatives B through F would similarly include inspection offshore structures and removal of derelict fishing gear and other accumulated debris. This

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				would provide a **minor** benefit by removing potentially harmful marine debris from the environment.
Accidental releases: Trash and debris	Trash and debris could be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey activities; and cable, line, and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Worldwide, 62 of 123 (50.4%) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced mortality rates of 0 to 22%. Mortality has been documented in cases of debris interactions as well as blockage of the digestive tract, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects to individuals to population-level impacts (Browne et al. 2015).	As population and vessel traffic increase gradually over the next 35 years, accidental release of trash and debris could increase. Trash and debris could continue to be accidentally released through fisheries use and other offshore and onshore activities. There could also be a long-term risk from exposure to plastics and other debris in the ocean. Worldwide, 62 of 123 (50.4%) of marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Mortality has been documented in cases of debris interactions, as well as blockage of the digestive tract, disease, injury, and malnutrition (Baulch and Perry 2014).	See Accidental releases: Fuel/fluids/hazmat for analysis.	See Accidental releases: Fuel/fluids/hazmat for analysis.
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1% of the Earth's magnetic field or about 0.05 μT (Kirschvink 1990) and are thus likely to be very sensitive to minor changes in magnetic fields (Walker et al. 2003). There is a potential for animals to react to local variations of the geomagnetic field caused by power cable EMFs. Depending on the magnitude and persistence of the confounding magnetic field, such an effect could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an effect on marine mammals is more likely to occur with DC cables than with AC cables (Normandeau Associates, Inc. et al. 2011). However, there are numerous transmission cables installed across the seafloor, and no impacts on marine mammals have been demonstrated from this source of EMF.	During operation, future new cables would produce EMF. Submarine power cables in the marine mammal geographic analysis area are assumed to be installed with appropriate shielding and at a sufficient burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Marine mammals have the potential to react to submarine cable EMF; however, no effects from the numerous submarine cables have been observed. Further, this IPF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to this IPF would be low, and as a result, impacts on marine mammals would not be expected.	**Offshore:** Under the No Action Alternative, up to 10,024 miles of cable would be added in the geographic analysis area, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use HVAC transmission, but HVDC designs are possible and could occur. EMF effects on marine mammals from these future projects would vary in extent and magnitude depending on overall cable length, the proportion of buried vs. exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). However, measurable EMF effects are generally limited to within inches to tens of feet of cable corridors, and standard design guidance for offshore wind energy transmission cable installation (i.e., avoiding cable crossings and maintaining a minimum separation) would limit additive EMF effects from adjacent cables. BOEM would additionally require these future submarine power cables to have appropriate shielding and be at a sufficient	**Offshore:** Exponent (2021) modeled EMF levels that could be generated by the RWEC, OSS-link cable, and IACs. They estimated induced magnetic field levels ranging from 147 to 1,071 mG on the bed surface above the buried and exposed RWEC and OSS-link cable and 57 to 522 mG above the IACs (see the EMF summary table in Section 3.6.2.3.2). Induced field strength would decrease rapidly with distance from the source, dropping below 100 mG within 3.3 feet of the seafloor directly above the cables. Induced magnetic field strength would fall effectively to 0 mG within 25 feet of the centerline of each cable segment. The only exception would occur at the RWEC landing location, where the two cable corridors would approach to within 10 feet. Measurable magnetic field effects would extend between 25 to 50 feet from the outer edge of the combined cable path. The magnetic field effects generated by exposed segments of the IAC, RWEC, and OSS-link cable are comparable in magnitude to the Earth's natural magnetic field, which is on the order of 517 mG within the RWF. Background magnetic field conditions would fluctuate by 1 to 10 mG

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			burial depth to minimize potential EMF effects from cable operations. At least seven existing submarine power and communications cables are present in the vicinity of the RI/MA WEA. These cables would presumably continue to operate and generate EMF effects under the No Action Alternative. While the type and capacity of those cables is not specified, the associated baseline EMF effects can be inferred from available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 m) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects. Additionally, literature suggests that most marine species cannot sense low-intensity electric or magnetic fields generated by the HVAC power transmission cables commonly used in offshore wind energy projects (Gill et al. 2005; Kilfoyle et al. 2018). EMF effects from continued operations of existing submarine power cables would produce similar **negligible** adverse effects on marine mammals for the duration of cable operations because of the localized nature of the effects and limited anticipated exposure.	from the natural field effects produced by waves and currents. The maximum induced electrical field experienced by any organism close to the exposed cable would be no greater than 0.7 mV/m (Exponent 2021). BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects (CSA Ocean Sciences Inc. and Exponent 2019; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense low-intensity electric or magnetic fields generated by the HVAC power transmission cables commonly used in offshore wind energy projects. Normandeau et al. (2011) concluded that marine mammals are unlikely to detect magnetic field intensities below 50 mG, suggesting that these species would be insensitive to EMF effects from Project electrical cables. Project-related EMFs would drop below this threshold and would become undetectable within 3.3 feet (1 m) of the seafloor, except for RWEC cable segments lying on the bed surface. The area exposed to magnetic field effects greater than 50 mG would be small, extending less than 5 feet above the bed surface immediately over the exposed cable segment. The 50-mG detection threshold is theoretical and an order of magnitude lower than the lowest observed magnetic field strength resulting in observed behavioral responses (Normandeau et al. 2011). These factors indicate that the likelihood of marine mammals encountering detectable EMF effects is low, and any exposure would be below levels associated with measurable biological effects. Therefore, EMF effects on marine mammals would be **negligible** adverse under Alternatives B through F. Due to the reduced total length of IAC under Alternatives C through F as compared to the Proposed Action, the EMF effects under Alternatives C through F would be similar in nature but proportionally less than under the Proposed Action. Due to the higher capacity of the turbines in Alternative F, there is potential for greater operational noise impacts around each individual turbine, although specifics of these impacts are not certain. BOEM anticipates that most planned facilities would use HVAC transmission, but some could use HVDC. BOEM would require all future projects to use cable designs and EPMs to minimize EMF impacts on the environment. While the range of EMF impacts would vary by project, they are expected to be similar in magnitude to those described for the Proposed Action. Standard design practices for offshore energy cables would avoid cable

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				crossings and maintain a minimum separation of several hundred feet between parallel cable paths where practicable (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). This would minimize additive EMF effects from multiple cables. On this basis, cumulative EMF effects on marine mammals resulting from Alternatives B through F combined with existing, planned, and reasonably foreseeable activities would be **negligible** adverse due to the localized nature of effects and limited anticipated exposure.
Bycatch	Bycatch is a significant population stressor for smaller cetaceans and pinnepeds. NOAA examined the bycatch of 10 species of cetaceans and pinnepeds from the Mid-Atlantic bottom trawl fishery. Mean annual serious injury and mortality estimates for eight of the 10 species were below their potential biological removal (PBR) levels. The exceptions were gray and harp seals, for which PBRs are unknown. Bycatch occurs in various gillnet and trawl fisheries in New England and the mid-Atlantic coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; NMFS 2018a).	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	A range of monitoring activities have been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect marine mammals through the potential for bycatch and/or injury by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts would be similar in nature but reduced in extent in comparison impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on marine mammals, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on invertebrates would be **negligible** to **minor** adverse and short term in duration.	Revolution Wind is proposing to implement the FRMP as part of Alternatives B through F (Revolution Wind and Inspire Environmental 2021). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operation on benthic habitat structure and composition and on marine species. The following survey methods could impact marine mammals: Ventless trap surveys to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total) Otter trawl surveys to assess abundance and distribution of target fish and invertebrate species within the RWF could impact a variety of invertebrate species as bycatch, four times per year for 2 years prior to and at least 2 years following completion of Project construction These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management. Survey fisheries gear (otter trawl surveys, ventless traps, and the anchoring lines and buoys used to secure acoustic telemetry equipment) could pose an entanglement risk to marine mammals. Post-ROD ventless trap surveys would employ the use of both weak link and weak rope technologies that are consistent with recommendations from NMFS. As such, impacts to marine mammals are

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				expected to be negligible based upon the limited number of associated buoy lines and the implementation of risk reduction measures such as no wet storage of fishery monitoring gear; no buoy lines floating at the surface; all sampling gear would be hauled at least once every 30 days; all gear would be removed from the water at the end of each sampling season; all groundlines would be constructed of sinking line; and knot-free buoy lines would be encouraged. For trawl surveys, large whale species have the speed and maneuverability to avoid oncoming mobile gear (NMFS 2016), and due to the few proposed trawl surveys and short tow times, impacts on marine mammals are anticipated to be **negligible** adverse. Acoustic telemetry receiver systems pose a negligible risk of harm to marine mammals. Based on the type of equipment and the fact that a small number of receivers deployed (up to 19 total) would be distributed over a large area, BOEM considers the effects of this Project element on marine mammals to be negligible. Similarly, moored and autonomous PAM systems would use the best available technology to reduce any potential risks of entanglement. PAM system deployment would avoid and minimize impacts. Therefore, the effects of this type of survey equipment on marine mammals would be **negligible** adverse.
Light	Light sources include marine vessels; offshore buoys and towers; and onshore structures, such as buildings and ports. Onshore structures emit a great deal of light on an ongoing basis, greater than offshore structures. Marine vessels have an array of lights, including navigational lights and deck lights. There is little downward-focused lighting and therefore only a small fraction of the emitted light enters the water. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light could also disrupt natural cycles (e.g., spawning), possibly leading to short-term impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	**Offshore:** The addition of up to 3,008 new offshore structures in the geographic analysis area with long-term hazard and aviation lighting, as well as lighting associated with construction vessels, would increase artificial lighting. Orr et al. (2013) concluded that the operational lighting effects from wind farm facilities to marine mammal distribution, behavior, and habitat use were uncertain but likely negligible if recommended design and operating practices are implemented. BOEM (2021) would require wind farm developers to comply with current design guidance for avoiding and minimizing artificial lighting effects. On this basis, BOEM anticipates artificial lighting impacts from future wind farm development and other offshore activities would result in **negligible** adverse effects on marine mammals for the duration of the offshore activity.	**Offshore:** Construction of the RWF and RWEC would introduce mobile and intermittent artificial light sources on construction vessels. The RWF would also introduce stationary artificial light sources in the form of navigation, safety, and work lighting. Revolution Wind would follow BOEM (2021) guidance for construction and structural lighting and would use only the minimum type and amount of lighting required by regulation (see Table F-1 in Appendix F). Therefore, BOEM anticipates that short- to long-term lighting effects from RWF and RWEC construction, operations, and decommissioning on marine mammals would be **negligible** adverse for the Proposed Action. The effects of this IPF would be similar under Alternatives C through F but reduced in extent and to the duration of construction activities. The Proposed Action when combined with planned future activities would develop up to 3,110 offshore WTGs and OSS foundations in the geographic analysis area. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on the structures, respectively. Given the minimal and localized

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				nature of anticipated lighting effects, the cumulative effects from Alternatives B through F and existing and planned future activities on marine mammals would be **negligible** adverse, mostly attributable to existing, ongoing activities.
New cable emplacement/ maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be local and generally limited to the emplacement corridor. Data are not available regarding marine mammal avoidance of localized turbidity plumes; however, Todd et al. (2015) suggest that since some marine mammals often live in turbid waters and some species of mysticetes and sirenians employ feeding methods that create sediment plumes, some species of marine mammals have a tolerance for increased turbidity. Similarly, McConnell et al. (1999) documented movements and foraging of grey seals in the North Sea. One tracked individual was blind in both eyes but otherwise healthy. Despite being blind, observed movements were typical of the other study individuals, indicating that visual cues are not essential for grey seal foraging and movement (McConnell et al. 1999). If elevated turbidity caused any behavioral responses such as avoiding the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be temporary and short term. Turbidity associated with increased sedimentation could result in temporary, short-term impacts on marine mammal prey species (see Table E2-4).	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short term. Turbidity associated with increased sedimentation could result in temporary, short-term impacts on some marine mammal prey species (see Table E2-4).	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Noise: Aircraft	Aircraft routinely travel in the marine mammal geographic analysis area. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from marine mammals. If flights are at a sufficiently low altitude, marine mammals could respond with behavioral changes,	Future low-altitude aircraft activities such as surveys and navy training operations could result in short-term responses of marine mammals to aircraft noise. If flights are at a sufficiently low altitude, marine mammals could respond with behavior changes, including short surface durations, abrupt dives, and percussive behaviors (i.e.,	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area. Similarly, aircraft have the potential to disturb hauled out seals if aircraft overflights occur within 2,000 feet (610 m) of a haul out area (Efroymson et al. 2000). However, this disturbance would be temporary, short term, and result in minimal energy expenditure. These brief responses would be expected to dissipate once the aircraft has left the area.	breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area.		
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in high-intensity, high-consequence impacts, including auditory injuries, stress, disturbance, and behavioral responses, if present within the ensonified area (NOAA 2018). Survey protocols and underwater noise mitigation procedures are typically implemented to decrease the potential for any marine mammal to be within the area where sound levels are above relevant harassment thresholds associated with an operating sound source to reduce the potential for behavioral responses and injury (PTS/TTS) close to the sound source. The magnitude of effects, if any, is intrinsically related to many factors, including acoustic signal characteristics, behavioral state (e.g., migrating), biological condition, distance from the source, duration and level of the sound exposure as well as environmental and physical conditions that affect acoustic propagation (NOAA 2018).	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Noise: Turbines	Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the BIWF, this low frequency noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base. Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), sound pressure levels would be expected to be at or below ambient levels at relatively short distances from the WTG foundations.	This sub-IPF does not apply to future non–offshore wind development.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can result in high-intensity, low-exposure level, long-term but localized, intermittent risk to marine mammals. Impacts would be localized in nearshore waters. Pile-driving activities could negatively affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	with pile-driving activities can interfere with these functions and have the potential to cause a range of responses, including insignificant behavioral changes, avoidance of the ensonified area, PTS, harassment, and ear injury, depending on the intensity and duration of the exposure. BOEM assumes that all ongoing and potential future activities would be conducted in accordance with a project-specific IHA to minimize impacts on marine mammals.			
Noise: Cable laying/trenching	N/A	Cable laying impacts resulting from future non–offshore wind activities would be identical to those described for future offshore wind projects.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational, and fishing vessels; scientific and academic research vessels; and other construction vessels. The frequency range for vessel noise falls within marine mammals' known range of hearing and would be audible. Noise from vessels presents a long-term and widespread impact on marine mammals across most oceanic regions. While vessel noise could have some effect on marine mammal behavior, it would be expected to be limited to brief startle and temporary stress response. Results from studies on acoustic impacts from vessel noise on odontocetes indicate that small vessels at a speed of 5 knots in shallow coastal water can reduce the communication range for bottlenose dolphins within 164 feet (50 m) of the vessel by 26% (Jensen et al. 2009). Pilot whales in a quieter deep-water habitat could experience a 50% reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther away from the sound source compared to higher frequencies, low-frequency cetaceans are at a greater risk of experiencing Level B harassment produced by vessel traffic.	Any offshore projects that require the use of ocean vessels could result in long term but infrequent impacts on marine mammals, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes. However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals and no stock or population-level effects would be expected.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats and are expected to result in temporary, short-term impacts, if any, on marine mammals. Vessel noise could affect marine mammals, but response would be expect to be temporary and short term (see Vessels: Noise sub-IPF above). The impacts on water quality from sediment suspension during port expansion activities is temporary, short term and would be similar to those described under the New cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for	The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could lead to an increase in vessel traffic during construction (see Section 3.16), O&M, and decommissioning. The resulting change in vessel traffic in the geographic analysis area cannot be predicted because, while some ports have been identified as possibilities for expansion, no specific project plans have been proposed. Therefore, impacts would be **negligible** adverse. Any future port expansion and associated increase in vessel traffic would be subject to	Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects, but no specific improvements are included in Alternatives B through F. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. However, these localized habitat impacts are

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
		accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur (see the Traffic: Vessel collisions sub-IPF below).	independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on marine mammals regionwide.	unlikely to affect marine mammals within the geographic analysis area. Therefore, port utilization impacts associated with the Project would be **negligible** adverse under all Project alternatives. Future actions, should they occur, could involve activities like dredging, increases in vessel activity and underwater noise, and the expansion or development of new structures. These activities could lead to adverse effects on coastal and estuarine habitats used by marine mammals and their prey species. These projects could result in cumulative effects on marine mammals, but the extent and significance of these effects cannot be evaluated because no project proposals have been developed. No port improvements have been proposed as part of Alternatives B through F and therefore cumulative impacts would be **negligible** adverse. The environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA and MMPA compliance documents, and other regulatory approvals for each project.
Presence of structures: Entanglement or ingestion of lost fishing gear	There are more than 130 artificial reefs in the Mid-Atlantic region. This sub-IPF could result in long-term, high-intensity impacts but with low exposure due to localized and geographic spacing of artificial reefs. Currently bridge foundations and the BIWF could be considered artificial reefs and could have higher levels of recreational fishing, which increases the chances of marine mammals encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Moore and van der Hoop 2012), if present nearshore where these structures are located. There are very few, if any, areas within the OCS geographic analysis area for marine mammals that would serve to concentrate recreational fishing and increase the likelihood that marine mammals would encounter lost fishing gear.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Presence of structures: Habitat conversion and prey aggregation	There are more than 130 artificial reefs in the Mid-Atlantic region. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and BIWF WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (NMFS 2015; Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for seals and small odontocetes compared to the surrounding soft bottoms.	The presence of structures associated with non–offshore wind development in nearshore coastal waters has the potential to provide habitat for seals and small odontocetes as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity benefits. Bridge foundations would continue to provide foraging opportunities for seals and small odontocetes with measurable benefits to some individuals. Hard-bottom (scour control and rock mattresses used to bury the offshore export cables) and vertical structures (i.e., WTG and ESP foundations) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (Causon and Gill 2018; Taormina	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
		et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for marine mammals compared to the surrounding soft bottoms.		
Presence of structures: Avoidance/Displacement	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF. There could be some impacts resulting from the existing BIWF, but given that there are only five WTGs, no measurable impacts are occurring.	Not contemplated for non–offshore wind facility sources.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Presence of structures: Behavioral disruption (breeding and migration)	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non–offshore wind facility sources.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Presence of structures: Displacement into higher risk areas (vessels and fishing)	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non–offshore wind facility sources.	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.
Traffic: Vessel collisions	Current activities that are contributing to this sub-IPF include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of death to NARWs, with as many as 75% of known anthropogenic mortalities of NARWs likely resulting from collisions with large ships along the U.S. and Canadian eastern seaboard (Kite-Powell et al. 2007). Marine mammals are more vulnerable to vessel strike when they are within the draft of the vessel and beneath the surface and not detectable by visual observers. Some conditions that make marine mammals less detectable include weather conditions with poor visibility (e.g., fog, rain, wave height) or nighttime operations. Vessels operating at speeds exceeding 10 knots have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007). Reported vessel collisions with whales show that serious injury rarely occurs at speeds below 10 knots (Laist et al. 2001). Data show that the probability of a vessel strike increases with the velocity of a vessel (Pace and Silber 2005; Vanderlaan and Taggart 2007).	Vessel traffic associated with non–offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018).	See Section 3.15.1.1 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on benthic habitat and are not analyzed.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of offshore impacts. Onshore Project activities would not result in impacts to marine resources. Therefore, IPFs associated with onshore activities would have no measurable effect on marine mammals and are not analyzed.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Sediment deposition and burial	The USACE and/or private ports could undertake dredging projects periodically. Where dredged materials are disposed, marine species could be affected. However, such areas are typically recolonized naturally in the short term. Most species in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	No future activities were identified within the geographic analysis area for marine mammals other than ongoing activities.	Seafloor disturbance during the installation of transmission cables, sea-to-shore transition construction, and dredging activities would result in elevated suspended sediment concentrations in the water column. Based on modeled and observed TSS impacts for the Proposed Action and other regional wind farm projects (Elliot et al. 2017; RPS 2021; Vinhateiro et al. 2018), and maximum water column TSS concentrations could range from several hundred to several thousand mg/L in close proximity to the disturbance and would dissipate below 100 mg/L, usually within minutes to hours of the disturbance, depending on the types of sediments affected. In locations with predominantly sand or coarser sediments, water column effects would be limited to short-term TSS pulses below 100 mg/L extending a few hundred feet downcurrent within approximately 20 feet of the seafloor and dissipating to background conditions within approximately 1 to 2 hours after disturbance. Available information on marine mammal sensitivity to TSS indicates that water quality impacts would have negligible effects on marine mammals. First, periodic TSS concentrations on the order of 100 mg/L at or near the seafloor are within the range of baseline variability. Marine mammals that forage on or near the seafloor are unlikely to be affected by a short-term increase in TSS that is comparable to existing conditions. For example, researchers have observed that visually impaired grey and harbor seals are able to navigate and locate prey just as effectively as their fully sighted counterparts (McConnell et al. 1999; Newby et al. 1970; Todd et al. 2015), indicating that short-term visual impairment would have no measurable effect on foraging ability. While research on TSS sensitivity in dolphins and large whales is generally lacking, these species developed the ability to echolocate by evolving in environments having variable and often low visibility (Tyack and Miller 2002). This suggests that a short-term reduction in visibility would have no effect on communication, foraging success, and predator avoidance and would not result in displacement or other observable changes in behavior. These factors indicate that marine mammal exposure to water quality effects resulting from construction of future offshore wind farms would be limited. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or communication. On this basis, water quality effects on marine mammals resulting from future offshore	RPS (2021) modeled the magnitude and extent of anticipated TSS concentrations resulting from RWF and RWEC construction. Maximum water column TSS concentrations could exceed 500 mg/L in close proximity to the disturbance. The majority of water column effects would be limited to short-term TSS pulses below 100 mg/L, occurring in plumes extending approximately 6 to 20 feet off the seafloor and 580 to 4,134 feet downcurrent. Dredging used to level the seabed and achieve greater burial depths for RWEC installation would produce TSS plumes with concentrations up to 100 mg/L extending from the seabed to the surface extending from 3,067 to 5,838 feet downcurrent. In most locations, TSS concentrations would dissipate to background conditions within approximately 1 to 2 hours after disturbance; however, in selected locations—specifically at the sea-to-shore transition construction area—TSS concentrations greater than 100 mg/L could linger for up to 36 hours. These modeled estimates are similar to those developed for BIWF construction. The observed extent of TSS impacts at the BIWF turned out to be considerably lower than the modeled estimates (Elliot et al. 2017), indicating that the potential impacts described here are likely conservative. Both the modeled TSS effects, which are conservatively high, and the observed TSS effects were short term and within the range of baseline variability. Based on available information (see No Action Alternative at left) a short-term reduction in visibility would have no meaningful effects on communication, foraging, and predator avoidance, particularly given that measurable TSS impacts would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. These factors indicate that marine mammal exposure to water quality effects resulting from construction of all Project alternatives would be **negligible** adverse under Alternatives B through F because of the limited sensitivity of marine mammals to TSS and the temporary nature of the impact. Alternatives C through F would result in a shorter overall length of IAC installation, proportionally reducing the extent and duration of suspended sediment impacts relative to the Proposed Action. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or communication. Seafloor disturbance during O&M activities would be limited under all Project alternatives, but reduced in extent under Alternatives C through F. As noted above,

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			wind farm construction would be **negligible** adverse and short term in duration.	the cables are unlikely to require repair or maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Replacement of the cable protection could result in localized, temporary increases in TSS. However, consistent with impacts of cable installation, suspended sediment plumes would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. Potential effects of removal of the cable during decommissioning would be similar in nature to those anticipated for cable installation or replacement of cable protection. Thus, sediment deposition and burial effects on marine mammals resulting from Project O&M and decommissioning under Alternatives B through F would be temporary **negligible** adverse. BOEM estimates a cumulative total of up to 30,885 acres of seafloor disturbance for Alternatives B through F plus all other future offshore wind projects in the geographic analysis area. As discussed above, TSS effects on marine mammals are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on marine mammals are expected from reduced water quality. Therefore, Alternatives B through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on marine mammals.
Climate change: Warming and sea level rise, storm severity/ frequency	Increased storm frequency could result in increased energetic costs for marine mammals and reduced fitness, particularly for juveniles, calves, and pups.	No future activities were identified within the geographic analysis area for marine mammals other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.
Climate change: Ocean acidification	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth or decline of invertebrates that have calcareous shells.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.
Climate change: Warming and sea level rise, altered habitat/ecology	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammals as a result of changes in distribution, reduced breeding and/or foraging habitat availability, and disruptions in migration.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.
Climate change: Warming and sea level rise, altered migration patterns	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammal habitat use and migratory patterns. For example, the NARW appears to be migrating differently and feeding in different areas in response to changes in prey densities related to climate change (MacLeod 2009; Nunny and Simmonds 2019; Record et al. 2019).	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Climate change: Warming and sea level rise, increased disease frequency	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of marine mammals, such as Phocine distemper. Climate change is clearly influencing infectious disease dynamics in the marine environment; however, no studies have shown a definitive causal relationship between any components of climate change and increases in infectious disease among marine mammals. This is due in large part to a lack of sufficient data and the likely indirect nature of climate change's impact on these diseases. Climate change could affect the incidence or prevalence of infection, the frequency or magnitude of epizootics, and/or the severity or presence of clinical disease in infected individuals. There are a number of potential proposed mechanisms by which this might occur (see summary in Burge et al. 2014).	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.
Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition	Increased storm frequency could result in increased energetic costs for marine mammals, reduced fitness, particularly for juveniles, calves, and pups. Erosion could impact seal haul outs, reducing their habitat availability, especially as sea walls and other obstructions are added, blocking seals access to shore.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.	See Section 3.15.1.1 for analysis.	See Sections 3.15.2.2 and 3.15.2.3 for analysis of impacts.

Sea Turtles

Table E2-6. Summary of Activities and the Associated Impact-Producing Factors for Sea Turtles

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Bembenek-Bailey et al. 2019; Camacho et al. 2013; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases could result in impacts on sea turtles due to effects on prey species (see Table E2-4).	See Table E1-4 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka 2010; Wallace et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Bembenek-Bailey et al. 2019; Camacho et al. 2013; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases could result in impacts on sea turtles due to effects on prey species (see Table E2-4).	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Accidental releases: Trash and debris	Trash and debris could be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey	Trash and debris could be accidentally discharged through fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation; navigation and traffic; survey	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	activities; cable, line, and pipeline laying; and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct ingestion of plastic fragments is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014). In addition to plastic debris, ingestion of tar, paper, Styrofoam™, wood, reed, feathers, hooks, lines, and net fragments have also been documented (Thomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Potential ingestion of marine debris varies among species and life history stages due to differing feeding strategies (Nelms et al. 2016). Ingestion of plastics and other marine debris can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal effects could include dietary dilution, chemical contamination, depressed immune system function, and poor body condition as well as reduced growth rates, fecundity, and reproductive success. However, these effects are cryptic, and clear causal links are difficult to identify (Nelms et al. 2016).	activities; cable, line, and pipeline laying; and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct and indirect ingestion of plastic fragments and other marine debris is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Gregory 2009; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014; Thomás et al. 2002). Ingestion can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). However, these effects are cryptic, and clear causal links are difficult to identify (Nelms et al. 2016).		
Anchoring	Vessel anchoring related to ongoing military use and survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor.	Impacts from anchoring could occur on a semiregular basis over the next 30 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for contact causing mortality of sea turtles. All impacts would be localized; turbidity would be temporary; impacts from contact would be recovered in the short term.	Future offshore wind projects could disturb up to 2,672 acres of seafloor from anchoring/mooring activities and the installation of associated undersea cables during offshore wind energy development, causing an increase in suspended sediment. This disturbance would be both localized and temporary in duration. Entanglement risks to sea turtles from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. No lines or rigging are anticipated for cable installation, and transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension. The likelihood of sea turtle entanglement under these conditions is discountable. In general, impacts to benthic habitats are unlikely to directly affect sea turtles but could indirectly affect these species through impacts on their prey. As discussed in Section 3.6, BOEM anticipates that impacts to benthic habitats and invertebrates would likely range from minor to moderate adverse. Certain sea turtle species, such as loggerheads, that feed on benthic invertebrates could experience short-term reductions in prey availability that are limited in extent, potentially offset by long-term increases in prey abundance from maturing reef effects. Thus, effects of anchoring and new cable emplacement/maintenance on sea turtles under the No Action Alternative would be **negligible** adverse.	Offshore: Sea turtles near the Project would likely be foraging, and prey items could include benthic species affected by vessel anchoring and cable emplacement/maintenance. The associated disturbance would be temporary; however, some benthic habitat conversion would also occur, as described in in Section 3.6. Project construction and installation would temporarily affect up to 6,632 acres of available foraging habitat until preconstruction species assemblages are recolonized and recovered. Benthic communities that inhabit dynamic bed (i.e., soft-bottom) habitats typically recover rapidly from construction-related disturbance, usually within 1 year (Dernie et al. 2003; UKBERR 2008), while some organisms associated with complex benthic habitat, like sponges and hydroids, could take a decade or longer to fully recover (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). The affected area is also subject to periodic bed disturbance by commercial fishing (CH2M HILL 2018), indicating that construction-related bed disturbance is not expected to measurably alter environmental baseline conditions. Because impacts to foraging habitat are mostly temporary and localized, the impact of Project activities associated with seafloor disturbance on sea turtles would be **negligible** adverse under Alternatives B through F but incrementally reduced under Alternatives C through F (a comparison of the benthic habitat disturbance footprints

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				under the different configurations of Alternatives C through E and the Proposed Action is provided in Table 3.6-8, Table 3.6-9, and Table 3.6-10 in Section 3.6). Entanglement risks to sea turtles from vessel anchoring and cable emplacement are not anticipated. Only larger construction and O&M vessels would anchor to the seafloor, using large heavy anchor chains. Per the COP, no divers would be used and no lines or rigging are anticipated for cable installation and maintenance. Transmission cables and jet plow umbilicals are large in diameter, relatively inflexible, and under constant tension throughout installation. Potential anchoring impacts during O&M and decommissioning would be similar to the construction phase but reduced due to fewer anchored vessels. As stated in Section 3.5.2 of the COP, the Project does not anticipate that the IAC, OSS-link cable, and RWEC would require significant maintenance. The cables themselves are unlikely to require repair, but up to 10% of cable protection could need to be replaced over the life of the Project. Effects to sea turtles from cable protection maintenance would result primarily from underwater noise, disturbance, and collision risk associated with O&M vessel activity. The IAC, OSS-link cable, and RWEC would be removed from the seafloor during Project decommissioning. Alternatives C through F would result in a reduced total length of IAC and a reduced extent of anchoring impacts relative to the Proposed Action. This would incrementally reduce the extent of O&M- and decommissioning-related impacts on sea turtles resulting from Project construction and would therefore be **negligible** adverse under Alternatives B through F because of the temporary and localized nature of the potential impacts. BOEM estimates a cumulative total of 5,803 acres of anchoring and mooring-related disturbance and 25,082 acres of cabling-related disturbance for the Proposed Action combined with all other future offshore wind projects within the geographic analysis area. Impacts from Alternatives C through F would be reduced in extent than the Proposed Action. The duration and magnitude of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated sea turtle forage species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover. While increases in foraging effort or displacement due to turbidity could occur to individual sea turtles, these temporary effects are not anticipated to

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				lead to population-level effects on sea turtle populations. Vessel anchoring and cable emplacement during construction, O&M, and decommissioning are not anticipated to involve equipment, lines, or rigging that could pose a potential entanglement risk to sea turtles. Therefore, Alternatives B through F when combined with past, present, and reasonably foreseeable projects would result in **negligible** adverse cumulative impacts to sea turtles.
			Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.
Bycatch	Impacts from bycatch are a primary threat to sea turtles (NOAA 2018). A reduction in bycatch has been achieved by the requirement for the use of bycatch mitigation measures. A comparison pre- versus post-regulation mean annual bycatch data for Mid-Atlantic fisheries (otter trawl, gillnet, scallop trawl, scallop dredge, Virginia pound net) showed sea turtle bycatch was reduced from 2,400 incidents to 1,700 and mortality was reduced from 1,000 to 470 based on data over the period 1990 to 2007 (Finkbeiner et al. 2011). In the Atlantic, bycatch occurs in various gillnet and trawl fisheries in New England and the Mid-Atlantic coast, with hotspots driven by marine mammal density and fishing intensity (Lewison et al. 2014; NMFS 2018a).	No future activities were identified within the geographic analysis area for this resource other than ongoing activities	A range of monitoring activities has been proposed to evaluate the short-term and long-term effects of existing and planned offshore wind development on biological resources and are also likely for future wind energy projects on the OCS. Some of these monitoring activities are likely to affect sea turtles through the potential for bycatch and/or injury by sample collection gear. Biological monitoring uses the same types of methods and equipment employed in commercial fisheries, meaning that impacts to sea turtles would be similar in nature but reduced in extent in comparison to impacts from current and likely future fishing activity. Monitoring activities are commonly conducted by commercial fishers under contract who would otherwise be engaged in fishing activity. As such, research and monitoring activities related to offshore wind would not necessarily result in an increase in bycatch-related impacts on sea turtles, although the distribution of those impacts could change. Therefore, any bycatch-related impacts on invertebrates would be **negligible to minor** adverse and short term in duration.	Revolution Wind is proposing to implement the FRMP as part of Alternatives B through F (Revolution Wind and Inspire Environmental 2021). The FRMP employs a variety of survey methods to evaluate the effect of RWF construction and operation on benthic habitat structure and composition and on marine species. The following survey methods could impact sea turtles: Ventless trap surveys to evaluate changes in the distribution and abundance of lobster and Jonah crab in the RWF and adjacent reference areas and Jonah crab, lobster, whelk (Buccinidae), and finfish along the RWEC corridor and adjacent reference areas; these areas would be surveyed 12 times per month for 7 months each for 2 years prior to and at least 2 years following completion of Project construction (4 years total) Otter trawl surveys to assess abundance and distribution of target fish and invertebrate species within the RWF trawls could impact a variety of invertebrate species as bycatch and would occur four times per year for 2 years prior to and at least 2 years following completion of Project construction. These surveys involve similar methods to and would complement other survey efforts conducted by various state, federal, and university entities supporting regional fisheries research and management. Survey fisheries gear (otter trawls, ventless traps, and the anchoring lines and buoys used to secure acoustic telemetry equipment) could pose an entanglement risk to sea turtles. However, this risk must be considered in the context of ongoing commercial fisheries activity. The

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				FRMP would contract commercial fishing vessels to conduct surveys, using commonly available commercial fishing gear. These contract vessels would likely be engaged in the commercial fishery if not involved in the FRMP, at least at an equivalent, if not greater, level of fishing effort. Therefore, the FRMP would not be likely to measurably change the quantity of fishing gear on the mid-Atlantic OCS or the amount of fishing effort that sea turtles are exposed to by gear type. Moreover, the FRMP would adhere to risk reduction measures such as no fishing monitoring gear would be in wet storage; no buoy lines would float at the surface; all sampling gear would be hauled at least once every 30 days; all gear would be removed from the water at the end of each sampling season; all groundlines would be constructed of sinking line; and knot-free buoy lines would be encouraged. When considered in combination, the anticipated impacts of the FRMP on sea turtles are anticipated to be **negligible** adverse. Acoustic telemetry receiver systems pose a negligible risk of harm to sea turtles. Based on the type of equipment, deployment near the seafloor, and the small number of receivers deployed (up to 19 in total) over a large area, BOEM considers the effects of this Project element on sea turtles to be **negligible** adverse. Similarly, moored and autonomous PAM systems would use the best available technology to avoid and minimize impacts on the environment. Based on their size and configuration of their mooring systems, PAM buoys pose an insignificant entanglement risk to sea turtles. Therefore, the effects of this type of survey equipment on sea turtles would likewise be **negligible** adverse under Alternatives B through F.
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea turtles foraging on benthic organisms could be able to detect magnetic fields while they are foraging on the bottom near the cables and up to potentially 82 feet (25 m) in the water column above the cable. Juvenile and adult sea turtles could detect the EMF over relatively small areas near cables (e.g., when resting on the bottom or foraging on benthic organisms near cables or concrete mattresses). There are no data on impacts on sea turtles from EMFs generated by underwater cables, although	During operations, future new cables would produce EMF. Submarine power cables in the geographic analysis area for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels (BOEM 2007: Section 5.2.7). EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Further, this IPF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to this IPF would be low, and as a result, impacts on sea turtles would not be expected.	Under the No Action Alternative, the future development of planned wind energy projects would result in up to 10,024 miles of new submarine electrical transmission cables in the geographic analysis area for sea turtles. Each cable would generate EMF effects within the immediate proximity. The available evidence indicates that sea turtles are magnetosensitive and orient to the Earth's magnetic field for navigation. Although they could be able to detect magnetic fields as low as 0.05 mG, they are unlikely to detect magnetic fields below 50 mG (Normandeau et al. 2011; Snoek et al. 2016). Potential EMF effects would be reduced by cable shielding and burial to an appropriate depth (typically 4–6 feet). Standard design guidance for offshore wind energy transmission cable installation avoids cable crossings where practicable and recommends maintaining a minimum separation of at least several hundred feet between Project	**Offshore:** There would be no EMF produced during construction of the offshore Project structures. The Project would generate EMF along the length of the IACs and offshore RWEC for the life of the Project until decommissioning. These effects would be most intense at locations where the RWEC cannot be buried and is laid on the bed surface covered by a stone or concrete armoring blanket. Approximately 8.8 miles of the RWEC cable, 0.9 mile of the OSS-link, and 15.5 miles of the IAC could be unburied and would require surface armoring. Exponent (2021) modeled EMF levels that could be generated by the RWEC, OSS-link cable, and IAC. It estimated induced magnetic field levels ranging from 147 to 1,071 mG on the bed surface above the buried and exposed RWEC and OSS-link cable and 57 to 522 mG above the IAC (see Section

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	anthropogenic magnetic fields can influence migratory deviations (Luschi et al. 2007; Snoek et al. 2016). However, any potential impacts from AC cables on turtle navigation or orientation would likely be undetectable under natural conditions and thus would be insignificant (Normandeau et al. 2011).		features and existing transmission and communication cables to avoid damaging existing infrastructure and for safety during installation (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). This separation distance would also avoid additive EMF effects from adjacent cables. Although artificial EMF effects on sea turtles are not well studied, the affected areas would be localized around unburied cable segments and limited to within 3 to 7.5 m of the cable surface (CSA Ocean Sciences Inc. and Exponent 2019). Deviations in migration therefore would have a negligible impact on energy expenditure in sea turtles. EMF effects from future offshore wind development would similarly be **negligible** adverse because of the limited anticipated exposure.	3.6). Induced field strength would decrease rapidly with distance from the source, dropping below 100 mG within 3.3 feet of the seafloor directly above the cable. Induced magnetic field strength would fall effectively to 0 mG within 25 feet of the centerline of each cable segment. The only exception would occur at the RWEC landing location, where the two cable corridors would approach to within 10 feet. Measurable magnetic field effects would extend between 25 to 50 feet from the outer edge of the combined cable path. BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects (CSA Ocean Sciences Inc. 2021; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense very low-intensity electric or magnetic fields at the typical AC power transmission frequencies associated with offshore renewable energy projects. Normandeau et al. (2011) indicate that sea turtles are magnetosensitive and orient to the Earth's magnetic field for navigation, but they are unlikely to detect magnetic fields below 50 mG. The majority of RWEC and IACs would be buried 4 to 6 feet below the bed surface, reducing the magnetic field in the water column below levels detectable to turtles. The transmission cables could produce magnetic field effects above the 50-mG threshold at selected locations where full burial is not possible; these areas would be localized and limited in extent. Magnetic field strength at these locations would decrease rapidly with distance from the cable and drop to 0 mG within 25 feet. Peak magnetic field strength is below the theoretical 50-mG detection limit along the majority of cable length, only exceeding this threshold above the short cable segments laid on the bed surface. Those EMF effects would dissipate below the 50 mG threshold 3.3 feet (1 m) of the seafloor, except for RWEC cable segments lying on the bed surface. This indicates that turtles would only be able to detect induced magnetic fields within a few feet of cable segments lying on the bed surface. These cable segments would be relatively short (less than 100 feet long) and widely dispersed. Exponent (2021) concluded that the shielding provided by burial and the grounded metallic sheaths around the cables would effectively eliminate any induced electrical field effects detectable to turtles. Given the limited extent of measurable magnetic field levels and limited potential for mobile species like sea turtles to encounter field levels above detectable thresholds, the effects of Project-related

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				EMF exposure on sea turtles would be **negligible** adverse for the life of the Project for the Proposed Action. Alternatives C through F would result in similar EMF impacts to those described for the Proposed Action, but those impacts would be reduced in extent and the total area exposed would vary depending on the alternative and configuration selected (see Tables 3.6-23, 3.6-24, and 3.6-25 in Section 3.6). Heat from the buried RWEC and IACs could affect some benthic organisms that represent forage for turtles, but little is known about the potential change to substrate temperatures that transmission cables might have on the benthos (Taormina et al. 2018). Benthic effects are not expected to impact leatherback turtles as benthic prey are not typically included in their diet. Effects to algal cover (green sea turtle forage) and crustaceans, gastropods, crabs, and bivalves (loggerhead sea turtle forage) could conceivably affect sea turtle foraging opportunities. However, because cables would be buried to a depth of 4 to 6 feet and/or covered with concrete protection, changes in temperature of the substrate at the surface of the seafloor is not anticipated to increase markedly. The potential effects of cable heat to the availability of turtle forage would be **negligible** adverse under Alternatives B through F. Project EMF effects would combine with those generated by the 10,024 miles of new and existing transmission cables from the other new offshore wind facilities planned on the mid-Atlantic OCS as well as other existing transmission cables. Submarine power cables would be installed with appropriate shielding and at a burial depth to reduce potential EMF at the substrate surface. The RWEC and IACs would maintain a minimum separation of at least several hundred feet from other known cables to avoid inadvertent damage during installation and additive EMF effects from adjacent cables (CSRIC 2014; Sharples 2011; TÜV SÜD PMSS 2014). Additionally, exposure to detectable levels of EMF would be limited to within 25 feet of the small number of areas where cable segments cannot be buried to the anticipated depth. This represents an extremely small percentage of the geographic analysis area for sea turtles and is unlikely to lead to biologically significant effects on sea turtle movement, migration, or foraging patterns. Therefore, the cumulative impacts associated with Alternatives B through F when combined with past, present, and reasonably foreseeable activities would represent a long-term **negligible** adverse impact on sea turtles.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				Onshore: Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.
Light: Vessels	Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, and scientific and academic research traffic have an array of lights, including navigational, deck, and interior lights. Such lights have some limited potential to attract sea turtles, although the impacts, if any, are expected to be localized and temporary.	Construction, operations, and decommissioning vessels associated with non–offshore wind activities produce temporary and localized light sources that could result in the attraction or avoidance behavior of sea turtles. These short-term impacts are expected to be of low intensity and occur infrequently.	**Offshore:** Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. Although responses to light have been studied in various species and life stages of sea turtles in nesting beach environments, the effects of offshore lighting remain uncertain. Shoreline development is the predominant existing artificial lighting source in the nearshore component of the geographic analysis area, whereas vessels, mainly fishing vessels, are the predominant artificial lighting source offshore. Future wind energy development would contribute additional light sources to the offshore component of the geographic analysis area, including a temporary increase in light from vessels used during construction and the long-term use of navigational lighting on new WTGs and OSSs. An estimated 3,008 foundations are forecasted for future wind energy construction. Each structure would have minimal white flashing navigational lighting as well as red flashing FAA hazard lights in accordance with BOEM's (2021) lighting and marking guidelines. Although the potential effects of offshore lighting on juvenile and adult sea turtles is uncertain, WTG lighting is anticipated to have a **negligible** adverse effect on sea turtles based on the lack of observed effects on sea turtles from decades of oil and gas platform operations in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs (BOEM 2021).	**Offshore:** Lights would be required on vessels and heavy equipment during construction. Most scientific studies on lighting effects on sea turtles were conducted at nesting sites, which do not occur in the RWF and RWEC. Gless et al. (2008) reported that previous studies showed that loggerhead turtles were attracted to lights from longline fishing vessels. Gless et al. (2008) conducted a laboratory study to see if juvenile leatherbacks responded to lights in the same way as loggerheads. Their study showed that leatherbacks either failed to orient or oriented at an angle away from the lights and concluded that there is no convincing evidence that marine turtles are attracted to vessel lights. Limpus (2006) indicates that navigation/anchor lights on top of vessel masts are not impactful but that bright deck lights should be shielded if possible to reduce impacts to sea turtles. Project EPMs (see Table F-1 in Appendix F) stipulate that construction vessel lightingwould be limited to the minimum necessary to ensure safety and to comply with applicable regulations. Additionally, BOEM (2021) has issued design guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels and has concluded that adherence to these measures should effectively avoid adverse effects on sea turtles. Considering the EPMs and the fact that construction vessel activity is unlikely to measurably alter baseline vessel light levels, temporary construction lighting effects on sea turtles would be **negligible** adverse. The RWF would include a variety of operational lighting, including navigational lighting for mariners, obstruction lighting for aviators, and vessel/work lighting for O&M (BOEM 2021). Orr et al. (2013) indicated that lights on wind generators flash intermittently for navigation or safety purposes and do not present a continuous light source. Limpus (2006) suggested that intermittent flashing lights with a very short "on" pulse and long "off" interval are nondisruptive to marine turtle behavior, irrespective of the color. Limpus (2006) also indicated that navigation/anchor lights on top of vessel masts are unlikely to adversely affect sea turtles but that bright deck lights should be shielded if possible to reduce impacts to sea turtles.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				Sea turtles' typical behavior of remaining predominantly submerged would additionally limit the exposure of individuals to operational lighting. BOEM (2021) has issued design guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and has concluded that adherence to these measures should effectively avoid adverse effects on fish. RWF adherence to design guidelines would ensure operational lighting effects on sea turtles would be minimal, temporary, and therefore **negligible** adverse. The Proposed Action would result in negligible incremental impacts to sea turtles through the installation of 102 lighted structures (100 WTGs and two OSSs). This represents approximately 3% of the projected increase in offshore lighting projected under the No Action Alternative. BOEM estimates a cumulative total of 3,110 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. All future wind farm projects would be expected to follow BOEM design guidance for lighting of offshore structures and avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (BOEM 2021; Orr et al. 2013). Adherence to these measures should effectively avoid adverse effects on aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. However, BOEM assumes that all offshore wind projects would be sited offshore, away from nesting beaches, and would not disorient nesting females or hatchling sea turtles. Because other planned and potential future offshore wind energy projects would be expected to adhere to the same measures to avoid adverse lighting impacts, the Proposed Action when combined with past, present, and reasonably foreseeable activities would also represent a **negligible** adverse cumulative impact on sea turtles. Alternatives C through F would include the same, or similar, extent of light emissions as those described for the Proposed Action but would be reduced based on the reduction in the number of WTGs and other operational lighting elements, resulting in a **negligible** adverse impact. Project lighting represents no more than a 3% projected increase in offshore lighting compared to the No Action Alternative. BOEM estimates a cumulative total of 3,066 to 3,103 offshore WTGs and OSS foundations for Alternatives C through F plus all other future offshore

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				wind projects in the geographic analysis area. Thus, the impacts of operational lighting are also considered **negligible** adverse.
			Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment regardless of alternative. Therefore, impacts of onshore activities and facilities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.
Light: Structures	Artificial lighting on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles. Artificial lighting on the OCS does not appear to have the same potential for effects. Decades of oil and gas platform operations in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2021).	Non-offshore wind activities would not be expected to appreciably contribute to this sub-IPF. As such, no impact on sea turtles would be expected.	See Light: Vessels above for offshore and onshore analysis.	See Light: Vessels above for offshore and onshore analysis.
New cable emplacement/ maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be local and generally limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020b). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020b). Turbidity associated with increased sedimentation could result in short-term, temporary impacts on sea turtle prey species (see Table E2-4).	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is short term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short term and temporary. Turbidity associated with increased sedimentation could result in short-term, temporary impacts on some sea turtle prey species (see Table E2-4).	See Anchoring above for offshore and onshore analysis.	See Anchoring above for offshore and onshore analysis.
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for sea turtles. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from sea turtles. If flights are at a sufficiently low altitude, sea turtles could respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.	Future low-altitude aircraft activities such as surveys and navy training operations could result in short-term responses of sea turtles to aircraft noise. If flights are at a sufficiently low altitude, sea turtles could respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts, including potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys using air guns, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.			
Noise: HRG	Possibly included in site characterization surveys and scientific surveys are high-resolution geophysical (HRG) surveys. HRG surveys could be conducted using one or two airguns as the acoustic source, but they generally use electromechanical sources such as side-scan sonars, shallow- and medium-penetration sub-bottom profilers, and single- or multibeam echosounders. Non-airgun HRG sources are often used in combination in order to acquire necessary data during a single deployment. HRG surveys are sometimes conducted using autonomous underwater vehicles equipped with multiple acoustic sources (NMFS 2018b). HRG surveys are typically on a time scale of weeks and higher frequency HRG survey noise resulting from cable route surveys could be less intense than G&G noise from site investigation surveys in WEAs. Impacts include potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). These impacts would be negligible as turtles would be expected to avoid exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Noise: Turbines	Available evidence suggests that typical underwater noise levels from operating WTGs would be below current cumulative injury and behavioral effect thresholds for sea turtles. Operating turbines were determined to produce underwater noise on the order of 110 to 125 $dB_{RMS,}$ occasionally reaching as high as 128 dB_{RMS} in the 10-Hz to 8-kHz range (Tougaard et al. 2020). As measured at the BIWF, low-frequency operational noise barely exceeds ambient levels at 164 feet (50 m) from the WTG base (Miller and Potty 2017). Operational noise impacts would be expected to be negligible.	This sub-IPF does not apply to future non–offshore wind development.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seafloor can result in high-intensity, low-exposure levels and long-term but localized intermittent risk to sea turtles. Impacts, potentially including behavioral responses, masking, TTS, and PTS, would be localized in nearshore waters. Data regarding threshold levels for impacts on sea turtles from sound exposure during pile driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts to turtles:	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.

Associated IPF: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
	Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB_{PEAK} SPL (Popper et al. 2014) Potential mortal injury: 204 dB_{SEL}, 232 dB_{PEAK} (PTS), 189 dB_{SEL}, 226 dB_{PEAK} (TTS) (Navy 2017) Behavioral harassment: 175 dB referenced to 1 µPa rms (Navy 2017)			
Noise: Cable laying/trenching	N/A	Cable laying impacts resulting from future non–offshore wind activities would be identical to those described for future offshore wind projects.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Noise: Vessels	The frequency range for vessel noise (10 to 1000 Hz) (MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum sensitivity between 200 to 700 Hz (Bartol 1994) and would therefore be audible. However, Hazel et al. (2007) suggest that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles could respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). Samuel et al. (2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns.	See Section 3.16. Any offshore projects that require the use of ocean vessels could result in long-term but infrequent impacts on sea turtles, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes, especially their submergence patterns (NSF and USGS 2011; Samuel et al. 2005). However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles, and no stock or population-level effects would be expected.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats and are expected to result in short-term, temporary impacts, if any, on sea turtles. Vessel noise could affect sea turtles, but response would be expected to be short- term and temporary (see the Vessels: Noise sub-IPF above). The impact on water quality from sediment suspension during port expansion activities is short term, temporary, and would be similar to those described under the New cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity would increase modestly. The ability of ports to receive the increase in larger ships would require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and could continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur (see the Traffic: Vessel collisions sub-IPF below).	The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could lead to an increase in vessel traffic during construction (see Section 3.16), O&M, and decommissioning. The resulting change in vessel traffic in the geographic analysis area cannot be predicted because, while some ports have been identified as possibilities for expansion, no specific project plans have been proposed. Therefore, impacts would be **negligible** adverse. Any future port expansion and associated increase in vessel traffic would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on sea turtles regionwide.	**Offshore:** Several regional ports could be used during Project construction, including ports in Baltimore, MD; New Bedford, MA; New London, CT; Norfolk, VA; Paulsboro, NJ; and Providence, RI, as well as Europe. The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects, but no specific improvements are included in Alternatives B through F. Therefore, impacts would be **negligible** adverse. Any future port expansion would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential environmental effects. Future actions, should they occur, could involve activities like dredging and the expansion or development of new structures that could lead to adverse effects on coastal and estuarine habitats used by sea turtles and their prey species. These projects could result in cumulative effects on sea turtles, but the extent and significance of these effects cannot be evaluated because no project proposals have been developed. Therefore, impacts would be **negligible** adverse. However, the environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA compliance documents, and other regulatory approvals for each project.
				Onshore: Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.

Associated IPF: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
Presence of structures: Entanglement or ingestion of lost fishing gear	The Mid-Atlantic region has more than 130 artificial reefs. Currently, bridge foundations and the BIWF could be considered artificial reefs and could have higher levels of recreational fishing, which increases the chances of sea turtles encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014) if present where these structures are located. At the scale of the geographic analysis area for sea turtles, there are very few areas that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Presence of structures: Habitat conversion and prey aggregation	The Mid-Atlantic region has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and BIWF WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (NMFS 2015; Taormina et al. 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for sea turtles compared to the surrounding soft bottoms.	The presence of structures associated with non–offshore wind development in nearshore coastal waters has the potential to provide habitat for sea turtles as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity beneficial impacts. Bridge foundations would continue to provide foraging opportunities for sea turtles, with measurable benefits to some individuals.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Presence of structures: Avoidance/Displacement	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF. There could be some impacts resulting from the existing BIWF, but given that there are only five WTGs, no measurable impacts are occurring.	Not contemplated for non–offshore wind facility sources.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Presence of structures: Behavioral disruption (breeding and migration)	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non–offshore wind facility sources.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Presence of structures: Displacement into higher risk areas (vessels and fishing)	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non–offshore wind facility sources.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020b). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020b). Turbidity associated with increased	The impact on water quality from sediment suspension during cable emplacement is short term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short term and temporary. Turbidity associated with increased sedimentation could result in short-term, temporary impacts on some sea turtle prey species.	As previously noted, up to 10,024 miles of cable would be added in the geographic analysis area. Cable placement and other related construction activities would disturb the seafloor, creating plumes of fine sediment that would disperse and resettle in the vicinity. Data are not available regarding impacts of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments could cause individuals to alter normal movements and behaviors. However, these changes would be limited in extent, short term in duration, and likely too small to be detected (NOAA 2020b). Seafloor disturbance during construction of future offshore wind projects could affect foraging success for some prey species; however, given that impacts would be short term and generally localized to the cable corridor, no population-level effects on sea turtles would be expected. Overall, anticipated effects from	**Offshore:** Construction of the RWF and offshore RWEC is expected to result in elevated levels of suspended sediment in the immediate proximity of bed-disturbing activities like pile driving, placement of scour protection, and trenching and burial of the RWEC and IAC. The majority of water column effects would be limited to short-term TSS pulses below 100 mg/L. Higher TSS concentrations exceeding 100 mg/L would occur in areas where seafloor sediments have a greater proportion of mud and silt. TSS plumes caused by construction disturbance would dissipate quickly, with concentrations above 100 mg/L lasting no longer than 6 hours at any location (RPS 2021). A summary of the anticipated extent of water column TSS and substrate burial effects is provided in Section 3.6. These effects would be short term because TSS levels are predicted to return to

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	sedimentation could result in short-term, temporary impacts on sea turtle prey species.		sediment deposition and burial on sea turtles would be **negligible** adverse.	normal within minutes to hours of activity completion, depending on the magnitude of disturbance and sediments disturbed. Direct physical effects from TSS exposure are unlikely because sea turtles breathe air and do not share the physiological sensitivities of susceptible organisms like fish and invertebrates. Turtles could alter their behavior in response to elevated suspended sediment levels (e.g., moving away from an affected area). They could also experience behavioral stressors (e.g., reduced ability to forage and avoid predators). However, turtles are highly mobile and can avoid short-term suspended sediment impacts that are limited in severity and range. Given the anticipated extent of potential suspended sediment impacts expected to result from the Project, sea turtle mobility to avoid exposure, and low sea turtle sensitivity to this stressor, effects to sea turtles from elevated suspended sediment levels would be **negligible** adverse. Alternatives C through F would result in similar impacts to sediment deposition and burial to the Proposed Action but reduced in extent and therefore **negligible**. Many sea turtle species routinely inhabit nearshore and estuarine environments with periodically high natural turbidity levels; therefore, short-term exposure to elevated suspended sediment is unlikely to measurably inhibit foraging (Michel et al. 2013). As discussed in Section 3.6, habitat disturbance and resettled sediment are natural ecosystem processes, and impacts on prey and foraging success for sea turtles would also be **negligible** adverse for Alternatives B through F. Seafloor disturbance during O&M activities would be limited. As noted previously, the cables are unlikely to require repair or maintenance, but up to 10% of cable protection could need to be replaced over the life of the Project. Replacement of the cable protection could result in localized, temporary increases in TSS. However, consistent with impacts of cable installation, suspended sediment plumes would be limited to within 10 to 12 feet of the seafloor in the open ocean waters where marine mammals are most likely to occur. Potential effects of removal of the cable during decommissioning would be similar in nature to those anticipated for cable installation or replacement of cable protection. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or mobility. Sediment deposition and burial effects on sea turtles resulting from Alternatives B through F Project O&M and decommissioning would be temporary **negligible** adverse. BOEM estimates a cumulative total of up to 30,885 acres of seafloor disturbance for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. Alternatives C through F would result in impacts similar to the Proposed Action, but the magnitude of those impacts would be reduced based on the smaller footprint proposed for these alternatives. As discussed above, TSS effects on sea

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				turtles are likely to be negligible adverse because of limited potential exposure to elevated TSS. No population-level effects on sea turtles are expected from reduced water quality. Therefore, Alternatives B through F when combined with past, present, and reasonably foreseeable activities would result in **negligible** adverse cumulative effects on sea turtles.
Traffic: Vessel collisions	Current activities contributing to this sub-IPF include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the coasts is likely to result in increased recreational boat traffic. In the United States, the percentage of strandings of loggerhead sea turtles that were attributed to vessel strikes increased from approximately 10% in the 1980s to a record high of 20.5% in 2004 (NMFS and USFWS 2007). Sea turtles are most susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed could exceed 10 knots in such waters, and evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007).	Vessel traffic associated with non–offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018).	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Warming and sea level rise, storm severity/frequency	Increased storm frequency could lead to long-term, high-consequence impacts on sea turtle onshore beach nesting habitat, including changes to nesting periods, changes in sex ratios of nestlings, and drowned nests as well as loss or degradation of nesting beaches. Offshore impacts, including sedimentation of nearshore hard-bottom habitats, have the potential to result in long-term, high-consequence changes to foraging habitat availability for green turtles.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Ocean acidification	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth or the decline of invertebrates that have calcareous shells.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Warming and sea level rise, altered habitat/ecology	This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtles by influencing distributions of sea turtles and/or prey resources. This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle breeding, foraging, and sheltering habitat use.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Warming and sea level rise, altered migration patterns	This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle habitat use and migratory patterns.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of sea turtles such as fibropapillomatosis.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Climate change: Warming and sea level rise, protective measures (barriers, sea walls)	The proliferation of coastline protections have the potential to result in long-term, high-consequence impacts on sea turtle nesting by eliminating or precluding access to potentially suitable nesting habitat or access to potentially suitable habitat.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.
Climate change: Warming and sea level rise; storm severity, frequency, sediment erosion, deposition	Sediment erosion and/or deposition in coastal waters has the potential to result in long-term, high-consequence impacts on green sea turtle foraging habitat. Additionally, sediment erosion has the potential to result in the degradation or loss of potentially suitable nesting habitat.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.	See Section 3.19.1.1 for analysis.	See Sections 3.19.2.2 and 3.19.2.3 for analysis.

Demographics, Employment, and Economics

Table E2-7. Summary of Activities and the Associated Impact-Producing Factors for Demographics, Employment, and Economics

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Energy generation/ security	In 2017, Massachusetts energy production totaled 125.2 trillion British thermal units (Btu), of which 72.4 trillion Btu was from renewable sources, including geothermal, hydroelectric, wind, solar, and biomass (U.S. Energy Information Administration 2018). In 2019, Rhode Island energy production totaled 8.8 trillion Btu from renewable resources, including biofuels, wood and waste, and noncombustible renewables. In the same year, Connecticut energy production totaled 211.9 trillion Btu, of which 37.2 trillion Btu was from renewable sources (U.S. Energy Information Administration 2021).	Ongoing development of onshore solar and wind energy would provide diversified, small-scale energy generation. State and regional energy markets would require additional peaker plants and energy storage to meet the electricity needs when utility scale renewables are not producing.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Light: Vessels	Ocean vessels have an array of lights, including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors. In the geographic analysis area for demographics, employment, and economics there are six existing power cables.	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 35 years.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Bedford Marine Commerce Terminal was upgraded	Ports would need to perform maintenance and upgrade facilities over the next 35 years to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	by the port specifically to support the construction of offshore wind energy facilities.			
Port utilization: Maintenance/ Dredging	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. As ports expand, maintenance dredging of shipping channels is expected to increase.	Ports would need to perform maintenance and upgrades over the next 35 years to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non–offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations, which could be known as fish aggregating devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on FADs.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Presence of structures: Viewshed	No existing offshore structures are within the viewshed of the WEA except buoys.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to the economy.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Traffic: Vessel collisions	The region's substantial marine traffic could result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates.	No substantial changes are anticipated.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Traffic: Vehicle	Onshore development activities support local population growth, employment, and economies. Disturbances can cause temporary, localized traffic delays and restricted access to adjacent properties.	Onshore development projects would be ongoing in accordance with local government land use plans and regulations.	See Section 3.11.1.1 for analysis.	See Sections 3.11.2.2 and 3.11.2.3 for analysis of impacts.
Climate change	Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and the economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries and other natural resources, increased disease frequency, and sedimentation, among other factors.	Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential offshore wind developments, would also provide incremental reductions.	Because future offshore wind energy facilities would produce less GHG emissions than fossil fuel–combusting power generation facilities with similar capacities, these facilities would reduce the adverse effects of climate change on the demographic and economic health of coastal communities in the geographic analysis area. These beneficial impacts would be long term, but they would be **negligible** adverse given the magnitude of global GHG emissions and their adverse demographic, employment, and economic impacts.	During operations, the Proposed Action would have a beneficial impact to demographic, employment, or economic conditions in the geographic analysis area by contributing to a broader combination of actions to reduce future impacts from climate change over the long term. These beneficial impacts would be long term, but they would be **negligible** adverse given the magnitude of global GHG emissions and their adverse demographic, employment, and economic impacts for all design configurations analyzed under the Proposed Action. Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would have long-term **major** adverse impacts on demographic, employment, and economic conditions in the geographic analysis area, primarily through the associated risks of flooding, extreme heat, and storm damage. Alternatives C through F would be similar to that for the Proposed Action: long term beneficial **negligible** during operations and cumulatively long term **major** adverse for all design configurations analyzed.

Environmental Justice

No IPFs with solely negligible impacts were identified.

Table E2-8. Summary of Activities and the Associated Impact-Producing Factors for Environmental Justice

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal; fisheries use; marine transportation; military use; survey activities; and cable, line, and pipeline laying. According to the Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue a similar trend to ongoing uses. Impacts are unlikely to affect water quality.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	Federation Limited (2021), which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases.			
Discharges	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because the EPA has established dredge spoil criteria and regulates the disposal permits issued by the USACE. The impact on water quality from sediment suspension during these future activities would be short term and localized.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Air emissions: Construction/ Decommissioning	Ongoing population growth and new development within the geographic analysis area is likely to increase traffic, with a resulting increase in emissions from motor vehicles. Some new industrial development could result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses and converting to more commercial or residential uses.	New development could include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations would continue to lose industrial uses, with no new industrial development to replace it. Cities such as New Bedford are promoting start-up space and commercial uses to reuse industrial space.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Air emissions: O&M	Ongoing population growth and new development within the geographic analysis area is likely to increase traffic, with a resulting increase in emissions from motor vehicles. Some new industrial development could result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses and converting to more commercial or residential uses.	New development could include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations would continue to lose industrial uses, with no new industrial development to replace it. Cities such as New Bedford are promoting start-up space and commercial uses to reuse industrial space.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
New cable emplacement/maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, and short-term impacts over the next 35 years.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Noise: O&M	Offshore O&M of existing wind energy projects generates negligible amounts of noise.	There are no reasonably foreseeable offshore facilities that would generate noise from O&M.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary,	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	local, and extend only a short distance beyond the work area.			
Noise: Trenching	Infrequent trenching for pipeline and cable laying activities emits noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 35 years for repair or new installation of underground infrastructure.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Presence of structures: Entanglement, gear loss/damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other.	Vessel traffic is generally not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Presence of structures: Onshore construction	Onshore development supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Presence of structures: Viewshed	There are no existing offshore structures within the viewshed of the WEA except buoys.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to employment.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.
Climate change	Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and the economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries, and other natural resources; increased disease frequency; and sedimentation, among other factors. Factors that make environmental justice populations particularly vulnerable to the adverse health, safety, and economic impacts of climate change-–related events such as heat waves, heavy	Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential offshore wind developments, would also provide incremental reductions.	See Section 3.12.1.1 for analysis.	See Sections 3.12.2.2 and 3.12.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	flooding, and droughts include where they live, language barriers, their health, and their limited financial resources to cope with these effects (Cho 2020; EPA 2017). The frequency and intensity of climate-related events such as heat waves and heavy flooding are becoming more frequent and more intense across most land regions, and this trend is expected to continue (IPCC 2021).			

Cultural Resources

No IPFs with solely negligible impacts were identified.

Table E2-9. Summary of Activities and the Associated Impact-Producing Factors for Cultural Resources

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for water quality for a quantitative analysis of these risks. Accidental releases of fuel/fluids/hazmat occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. Both released fluids and cleanup activities that require the removal of contaminated soils and/or seafloor sediments can cause impacts on cultural resources because resources are impacted by the released chemicals as well as the ensuing cleanup activities.	Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases within the geographic analysis area for cultural resources, increasing the frequency of small releases. Although the majority of anticipated accidental releases would be small, resulting in small-scale impacts on cultural resources, a single, large-scale accidental release such as an oil spill, could have significant impacts on marine and coastal cultural resources. A large-scale release would require extensive cleanup activities to remove contaminated materials resulting in damage to or the complete removal of terrestrial and marine cultural resources. In addition, the accidentally released materials in deep water settings could settle on seafloor cultural resources such as wreck sites, accelerating their decomposition and/or covering them and making them inaccessible/unrecognizable to researchers, resulting in a significant loss of historic information. As a result, although considered unlikely, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on cultural resources.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Accidental releases: Trash and debris	Accidental releases of trash and debris occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. While the released trash and debris can directly affect cultural resources, the majority of impacts associated with accidental releases occur during cleanup activities, especially if soil or sediment removed during cleanup affect known and undiscovered cultural resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the cultural value of TCPs for stakeholders. State and federal laws	Future activities with the potential to result in accidental releases consist of construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications). Accidental releases would continue at current rates along the Northeast Atlantic coast.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	prohibiting large releases of trash would limit the size of any individual release and ongoing local, state, and federal efforts to clean up trash on beaches and waterways would continue to mitigate the effects of small-scale accidental releases of trash.			
Anchoring	The use of vessel anchoring and gear (i.e., wire ropes, cables, chains on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can impact cultural resources by physically damaging marine cultural resources such as shipwrecks and debris fields.	Future activities with the potential to result in anchoring/gear utilization consist of construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); military use; marine transportation; fisheries use and management; and oil and gas activities. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2. 7 for analysis of impacts.
Light: Vessels	Light associated with military, commercial, or construction vessel traffic can temporarily affect coastal historic structures and TCP resources when the addition of intrusive, modern lighting changes the physical environment (setting) of cultural resources. The impacts of construction and operations lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such as historic districts. Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts on coastal historic structure and TCP resources.	Future activities with the potential to result in vessel lighting impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Light: Structures	The construction of new structures that introduce new light sources into the setting of historic architectural properties or TCPs can result in impacts, particularly if the historic and/or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (commercial building, radio antenna, large satellite dishes, etc.) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Presence of structures	The only existing offshore structures within the viewshed of the geographic analysis area are minor features such as buoys.	Non-offshore wind structures that could be viewed would be limited to met towers. Marine activity would also occur within the marine viewshed of the geographic analysis area.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Presence of structures: Onshore construction	Onshore construction activities can impact terrestrial cultural resources by damaging and/or removing resources.	Future activities that could result in terrestrial land disturbance impacts consist of onshore residential, commercial, industrial, and military development activities in and near Quonset Point, Rhode Island. Onshore construction would continue at current rates.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
New cable emplacement/ maintenance	Current offshore construction activity is limited to submarine fiber-optic and electrical transmission cables, including six existing power cables in the geographic analysis area.	Future activities with the potential to result in seafloor disturbances similar to offshore impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; and oil and gas activities. Such activities could cause impacts on submerged marine cultural resources, including shipwrecks and formerly subaerially exposed pre-contact Native American cultural sites.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, storm severity/frequency	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would also result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources.	Sea level rise and storm severity/frequency would increase due to the effects of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, altered habitat/ecology	Altered habitat/ecology related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shell fishing, and fowling activities.	The rate of change to habitats/ecology would increase as a result of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, altered migration patterns	Altered migration patterns related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shellfishing, and fowling activities.	The rate of change to migratory animal patterns would increase as a result of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, property/ infrastructure damage	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources.	The rate of property and infrastructure damage would increase as a result of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, protective measures (barriers, sea walls)	The installation of protective measures such as barriers and sea walls would impact cultural resources during associated ground-disturbing activities. Construction of these modern protective structures would alter the viewsheds from historic properties and/or TCPs, resulting in impacts on the historic and/or cultural significance of resources.	The installation of coastal protective measures would increase as a result of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.
Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and	Sea level rise and storm severity/frequency would increase due to the effects of climate change.	See Section 3.10.1 for analysis.	See Sections 3.10.2.2 through 3.10.2.7 for analysis of impacts.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources.			

Recreation and Tourism

Table E2-10. Summary of Activities and the Associated Impact-Producing Factors for Recreation and Tourism

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Anchoring	Anchoring occurs due to ongoing military, survey, commercial, and recreational activities.	Impacts from anchoring would continue and could increase due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Modest growth in vessel traffic could increase the temporary, localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Light: Vessels	Ocean vessels have an array of lights, including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Light: Structures	Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently and would generate short-term disturbances.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Noise: O&M	Limited to BIWF	Not applicable.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Noise: Cable laying/trenching	Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also	Ports would need to perform maintenance and upgrade facilities over the next 35 years to ensure that they can	**Offshore:** Existing ports used for staging and construction of planned future projects could influence recreational	**Offshore:** Existing ports in the geographic analysis area that would be used for Project staging and construction

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	experiencing continual upgrades and maintenance. The New Bedford Marine Commerce Terminal was upgraded by the port specifically to support the construction of offshore wind energy facilities.	still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size.	opportunities or access. However, these ports are primarily industrial in character and are not intended to support recreational activity as a primary use. If used secondarily for recreation, any port improvements could result in short-term delays and crowding during construction but would result in increased berths and amenities for recreational vessels, improved navigational channels, or opportunities to separate recreational boating from commercial shipping in the long term. Because impacts to offshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of offshore wind industry development (BOEM 2016), only **negligible** adverse impacts on recreation and tourism could occur.	consist of the Port of Montauk, Port Jefferson, Port of Providence, Port of Davisville at Quonset Point, Point of Galilee, Port of New London, and New Bedford Marine Commerce Terminal. However, these ports are primarily industrial in character and are not intended to service recreational activity. Therefore, the Proposed Action would have a long-term **negligible** adverse impact on recreation and tourism due to port utilization within the geographic analysis area. Impacts of Alternatives C through F would be similar to the Proposed Action. As previously noted, existing ports used for O&M of the Project could influence recreational opportunities or access. However, these ports are primarily industrial in character and are not intended to support recreational activity as a primary use. Because impacts to offshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of offshore wind industry development (BOEM 2016), negligible adverse impacts on recreation and tourism could occur. Impacts during decommissioning would be similar to the impacts during construction and installation. Although Alternatives C through F would reduce the number of WTGs and associated IACs, the impact would be negligible adverse. Port activity would result in increased short-term construction traffic and long-term operational traffic to the No Action Alternative, which could coincide with recreational activity in the vicinity, depending on transportation type (e.g., vessels, rail, or road vehicle). However, activities related to the Proposed Action at port facilities would occur within the boundaries of existing ports or other repurposed industrial facilities where recreational users would not be expected to occur. Project activities at ports would be similar to those already taking place at these facilities and would be consistent with state and local agency guidelines regarding land use, access, noise and air quality, and other impacts on nearby neighborhoods. Alternatives C through F would reduce the number of WTGs and associated IACs, but Project impacts on this IPF would be similar to the Proposed Action, Therefore, Alternatives B through F when combined with past, present, and reasonably foreseeable activities would have **negligible** adverse cumulative impacts on recreation and tourism.
			Onshore: Impacts to onshore recreation and tourism related to current marine industrial activities at existing ports would not result in significant changes, regardless of	**Onshore:** The proposed O&M facility (located in the Port of Brooklyn, Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, or Port of Montauk) would be located within an existing industrial port. No new building

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			offshore wind industry development (BOEM 2016). Therefore, impacts would be **negligible** adverse.	construction would occur at the Port of Galilee or Port of Brooklyn; use of these ports is assumed to be limited to existing facilities maintained by the ports. However, a new building with up to 1,000 square feet of office space and up to 11,000 square feet of equipment storage space could be constructed at the Port of Davisville at Quonset Point or the Port of Montauk. A BOEM study suggests that impacts on recreation and tourism related to current marine industrial activities at existing ports would not experience significant long-term changes, regardless of offshore wind industry development (BOEM 2016). However, the study notes that although the Atlantic coast already possesses the necessary infrastructure to support offshore wind, the industry is still evolving (BOEM 2016), and communication, flexibility, and scalability are needed to ensure port selection would not impact tourism or recreation. Based on BOEM's findings, negligible temporary adverse impacts to recreation or tourism activities from port use are anticipated during construction. O&M facilities and activity would be indistinguishable from other industrial or commercial businesses and maritime activities that typically occur at proposed port locations. As these ports do not provide recreation as a primary service, O&M would have negligible adverse impacts on onshore recreation and tourism. Project facilities and port activity would be indistinguishable from other industrial or commercial businesses and maritime activities that typically occur at proposed port locations. As these ports do not provide recreation as a primary service, Alternatives B through F when combined with past, present, and reasonably foreseeable projects would result in temporary **negligible** adverse cumulative impacts to onshore recreation and tourism.
Port utilization: Maintenance/ Dredging	No major ports are within the geographic analysis area. Periodic maintenance is necessary for harbors within the geographic analysis area.	Ongoing maintenance and dredging of harbors within the geographic analysis area would continue as needed. No specific projects are known.	See Port Utilization: Expansion for analysis of offshore and onshore impacts.	See Port Utilization: Expansion for analysis of offshore and onshore impacts.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non–offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation locations, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on structures.			
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 35 years. The presence of navigation hazards is expected to continue at or near current levels.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts during offshore activities.
Presence of structures: Viewshed	The only existing offshore structures within the viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components of the Project would be limited to met towers. Marine activity would also occur within the marine viewshed.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic in the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 35 years. Marine commerce and related industries would continue to be important to the economy.	See Section 3.18.1.1 for analysis.	See Sections 3.18.2.2 and 3.18.2.3 for analysis of impacts.

Visual Resources

No IPFs with solely negligible impacts were identified.

Table E2-11. Summary of Activities and the Associated Impact-Producing Factors for Visual Resources

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Light: Vessels	Light associated with military, commercial, or construction vessel traffic can temporarily affect coastal viewsheds when the addition of intrusive, modern lighting changes the physical environment (setting). Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts.	Future activities with the potential to result in vessel lighting impacts consist of construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity	See Section 3.20.1.1 for analysis.	See Sections 3.20.2.2 and 3.20.2.3 for analysis.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
		along the Northeast coast, with a slight increase due to population increase and development over time.		
Light: Structures	The construction of new structures that introduce new light sources can result in impacts, particularly if the light source affects uninterrupted nighttime skies or periods of darkness. Any tall structure (e.g., commercial building, radio antenna, large satellite dish) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast but minimal offshore.	See Section 3.20.1.1 for analysis.	See Sections 3.20.2.2 and 3.20.2.3 for analysis.
Presence of structures	The only existing offshore structures within the viewshed of the geographic analysis area are minor features such as buoys.	Non-offshore wind structures that could be viewed would be limited to met towers. Marine activity would also occur within the viewshed of the geographic analysis area.	See Section 3.20.1.1 for analysis.	See Sections 3.20.2.2 and 3.20.2.3 for analysis.

Commercial Fisheries and For-Hire Recreational Fishing

No IPFs with solely negligible impacts were identified.

Table E2-12. Summary of Activities and the Associated Impact-Producing Factors for Commercial Fisheries and For-Hire Recreational Fishing

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	See Table E1-4 for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	See Table E1-4 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Accidental releases: Trash and debris	Trash and debris could be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, and lines and pipeline laying. Accidental releases of trash and debris are expected to be low probability events.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.1 for analysis of offshore impacts.
Anchoring	Impacts from anchoring occur due to ongoing military, survey, commercial, and recreational activities. The short-term, localized impact to this resource is the presence of a navigational hazard (anchored vessel) to fishing vessels.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Anchoring could pose a temporary (hours to days), localized (within a few hundred meters of the anchored vessel) navigational hazard to fishing vessels.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Light	Impacts include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.1 for analysis of offshore impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts.	cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time.		
New cable emplacement/ maintenance	New cable emplacement and infrequent cable maintenance activities disturb the seafloor, increase suspended sediment, and cause temporary displacement of fishing vessels. These disturbances would be local and limited to the emplacement corridor.	Future new cables and cable maintenance would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment, resulting in local, short-term impacts. If the cable routes enter the geographic analysis area for this resource, short-term disruption of fishing activities would be expected.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Noise: Construction, trenching, O&M	Noise from construction occurs frequently in coastal habitats in populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs likely have low to no impacts on fish and no impacts at a fishery level. Noise is also created by O&M of marine minerals extraction, which has small local impacts on fish, but likely no impacts at a fishery level.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Noise from dredging and sand and gravel mining could occur. New or expanded marine minerals extraction could increase noise during their O&M over the next 35 years. Impacts from construction, operations, and maintenance would likely be small and local on fish and not seen at a fishery level. Periodic trenching would be needed for repair or new installation of underground infrastructure. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on commercial fish species are typically less prominent than the impacts of the physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 35 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seafloor, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	through water and/or the seafloor can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area, leading to temporary, local impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions.			
Noise: Vessels	Vessel noise is anticipated to continue at levels similar to current levels. While vessel noise could have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 years.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Port utilization is expected to increase over the next 35 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic could require port modifications, such as channel deepening, leading to local impacts on fish populations. Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Presence of structures: Navigation hazard and allisions	Structures within and near the cumulative lease areas that pose potential navigation hazards consist of offshore wind turbines, buoys, and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	No known reasonably foreseeable structures are proposed to be located in the geographic analysis area that could affect commercial fisheries. Vessel allisions with non–offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level.	No future activities were identified within the analysis area other than ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Presence of structures: Habitat conversion and fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape, but there is some other hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitats to the new hard-structure habitat. Structure-oriented fishes are attracted to these locations. These impacts are local and can be short term to permanent. Fish aggregation could be considered adverse, beneficial, or neither. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on structures.	New cables, installed incrementally in the geographic analysis area over the next 20 to 35 years, would likely require hard protection atop portions of the route (see the New cable emplacement/maintenance IPF above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented species could be attracted to these locations. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). This could lead to more and larger structure-oriented fish communities and larger predators opportunistically feeding on the communities as well as increased private and for-hire recreational fishing opportunities. Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Greene et al. 2010; Guida et al. 2017). These impacts are expected to be local and could be long term.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Presence of structures: Migration disturbances	Human structures in the marine environment (e.g., shipwrecks, artificial reefs, buoys, and oil platforms) can attract finfish and invertebrates that approach the structures during their migrations. This could slow species migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 35 years could attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	No known reasonably foreseeable structures are proposed for location in the geographic analysis area that could affect commercial fisheries and for-hire recreational fishing.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Presence of structures: Cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between the mainland and islands. Seven submarine cable corridors cross cumulative lease areas. Shoreline developments are ongoing and consist of docks; ports; and other commercial, industrial, and residential structures.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Traffic: Vessels and vessel collisions	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports, and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy. The region's substantial marine traffic could result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is more complex as	New vessel traffic in the geographic analysis area would consistently be generated by proposed barge routes and dredging demolition sites. Marine commerce and related industries would continue to be important to the regional economy.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent.			
Climate change	Impacts to commercial fisheries and for-hire recreational fishing are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat/distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch and/or an increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. While climate change is predicted to have adverse impacts on the distribution and/or productivity of some stocks targeted by commercial fisheries and for-hire recreational fishing, other stocks could be beneficially affected. The economies of communities reliant on marine species that are vulnerable to the effects of climate change could be adversely affected. If the distribution of important stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.
Regulated fishing effort	Commercial and recreational regulations for finfish and shellfish implemented and enforced by NOAA Fisheries and coastal states affect how the commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These can reduce or increase the size of available landings to commercial and for-hire recreational fisheries. For example, ongoing fishing restrictions designed to rebuild depleted stocks in the Northeast Multispecies (large-mesh) fishery would continue to reduce landings in that fishery.	Reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the NARW by 60% (McCreary and Brooks 2019). This would likely have a **major** adverse impact on fishing effort in the lobster and Jonah crab fisheries in the geographic analysis area for this resource. As discussed in Karp et al. (2019), changing climate and ocean conditions and the resultant effects on species distributions and productivity can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits.	See Section 3.9.1.1 for analysis of offshore impacts.	See Sections 3.9.2.2 and 3.9.2.3 for analysis of offshore impacts.

Land Use and Coastal Infrastructure

Table E2-13. Summary of Activities and the Associated Impact-Producing Factors for Land Use and Coastal Infrastructure

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases: Fuel/fluids/hazmat	Various ongoing onshore and coastal construction projects include the use of vehicles and equipment that contain fuel, fluids, and hazardous materials that could be released.	Ongoing onshore construction projects involving vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release.	See Section 3.14.1.1 for analysis.	See Sections 3.14.2.2 and 3.14.2.3 for analysis of impacts.
EMFs	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the geographic analysis area. The extent of impacts is likely less than 50 feet (15.2 m) from the cable, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for land use and coastal infrastructures other than ongoing activities.	The onshore transmission lines used to connect power generated by future offshore wind projects to the electrical grid would generate detectable EMF effects within a short distance of cable corridors. Most, if not all, future onshore transmission cables would run belowground in buried cable ducts, reducing EMF exposure relative to aboveground electrical infrastructure. Based on modeled EMF levels for currently planned projects (Exponent 2018, 2020), typical EMF levels at approximately 3 feet (1 meter) immediately above the buried cable would range from 73 to 300 mG. Field strength would diminish rapidly with distance, decreasing to near 0 mG within 25 to 50 feet of the cable centerline. These potential effects must be placed in context with typical levels of EMF exposure experienced in everyday life. The National Institutes of Health (NIH 2002) determined that approximately 95% of the U.S. population has an average daily EMF exposure of approximately 4 mG from electrical systems and devices at home and work. Localized EMF levels in proximity to electrical power infrastructure are considerably higher. Typical magnetic fields within 50 feet of power distribution lines range from 10 to 20 mG for main feeders and 3 to 10 mG for laterals under typical loads, reaching as high as 40 to 70 mG under peak loads depending on the amount of current being carried (NIH 2002). Anticipated onshore EMF from offshore wind energy transmission cables would be comparable to, if not lower than, baseline EMF levels generated by existing aboveground electrical infrastructure. Future offshore wind projects would likely generate EMF levels similar to those for the Project. International Commission on Non-Ionizing Radiation Protection (ICNIRP) and International Committee on Electromagnetic Safety (ICES) guidance set exposure levels between 2,000 and 9,040 mG for the general population, although exact levels vary from state to state. The addition of wind energy transmission cables would result in slightly elevated onshore EMF levels.	**Offshore:** There would be no EMF produced during construction of the offshore Project structures. Offshore elements of the Proposed Action such as the WTGs, IAC, and OSS-link cable would generate EMF during operation. The cables produce a magnetic field, both perpendicularly and in a lateral direction around the cables. The calculated magnetic field at a height of 3.3 feet (1 m) above the seafloor is highest directly above the buried cables (IACs, 17 mG; RWECs, 41 mG; and RWEC landfall cables, 39 mG) and decreases rapidly with distance. EMF is reduced to less than 6 mG within 30 feet of the IACs, RWECs, and RWEC landfall cables. All calculated field levels are well below the ICNIRP reference level of 2,000 mG and the ICES exposure reference level of 9,040 mG for exposure of the general public. Therefore, effects would be **negligible** adverse. Impacts would be lower, but still similar, for Alternatives C through F due to the reduction of the number of WTGs and possible reduction of miles of IAC. Reasonably foreseeable future actions would also generate offshore EMF due to the use of similar Project components. However, it is anticipated that reasonably foreseeable future actions would also use similar construction and operations techniques, which includes shielding and protecting cables that are laid directly on the seafloor. Shielded electrical transmission cables do not directly emit electrical fields into surrounding areas but are surrounded by magnetic fields that can cause induced electrical fields in moving water. Due to the rapid dissipation of EMFs surrounding the cables and incorporation of protection measures, there would be a **negligible** adverse cumulative impact on land use and coastal infrastructure for Alternatives B through F. Impacts would be lower, but still similar, for Alternatives C through F due to the reduction of the number of WTGs and possible reduction of miles of IAC. **Onshore:** There would be no EMF produced during construction of the onshore Project structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			However, EMF levels decrease very rapidly with distance from the cables. For an 880-MW transmission cable, peak EMF would be 73 mG at the cable but would decrease to 2 mG at 25 feet from the cable. This is well below international EMF standards. The presence of slightly elevated levels of EMF from future offshore wind activities would have no effect on land use and coastal infrastructure because elevated EMF would not alter land use patterns, change land uses, or have any other effect on land use and coastal infrastructure. On this basis, the effects of EMF on land use under the No Action Alternative would be long term **negligible** adverse, as there would be no effect on land use and coastal infrastructure.	Between the TJBs and OnSS, the onshore transmission cables would be installed in a double-circuit underground duct bank. Modeling of the magnetic field levels associated with the operation of these cables calculates the magnetic field at peak loading directly over the duct banks at 73 mG or lower for the maximum 880-MW capacity of the RWF. This is well below the ICNRIP reference level of 2,000 mG and the ICES exposure reference level of 9,040 mG for the general public (Exponent 2020). Lower magnetic fields would be produced if the power generated by the RWF is less than 880 MW. Based on modeled EMF levels for the Proposed Action (Exponent 2020), typical EMF levels at approximately 3 feet (1 m) immediately above the buried cable would be a maximum of 73 mG. Field strength would diminish rapidly with distance, decreasing to near 0 mG within 25 to 50 feet of the cable centerline. These potential effects must be placed in context with typical levels of EMF exposure experienced in everyday life. The NIH (2002) determined that approximately 95% of the U.S. population has an average daily EMF exposure of approximately 4 mG from electrical systems and devices at home and work. Localized EMF levels in proximity to electrical power infrastructure are considerably higher. Typical magnetic fields within 50 feet of power distribution lines range from 10 to 20 mG for main feeders and 3 to 10 mG for laterals under typical loads, reaching as high as 40 to 70 mG under peak loads, depending on the amount of current being carried (NIH 2002). Therefore, the relative level of EMF from the onshore duct bank would be low compared to other electrical infrastructure. The underground transmission cables onshore would not be a direct source of any electric field aboveground due to cable construction, duct bank, and burial underground (vhb 2022). As EMFs would remain well below established thresholds and there would be no direct source of aboveground EMFs, it is anticipated that there would be no impact on land use and coastal infrastructure due to EMFs from O&M of onshore Project facilities. Decommissioning would result in no EMF impacts, similar to construction. Therefore, there would be a **negligible** adverse EMF impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of Alternatives B through F. Reasonably foreseeable future actions would likely generate EMF levels similar to those for the Project. On this basis, the cumulative effects of EMF on land use under all Project alternatives would be **negligible** adverse

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				as there would be no effect on land use and coastal infrastructure and Alternatives B through F have identical onshore facilities and activities.
Light: Structures	Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles, that would use nighttime lighting.	Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary, depending on the location, type, direction, and duration of nighttime lighting.	See Section 3.14.1.1 for analysis.	See Sections 3.14.2.2 and 3.14.2.3 for analysis of impacts.
New cable emplacement/maintenance	Onshore buried transmission cables are present in the area near the Project onshore and offshore improvements. Onshore activities would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts.	No known proposed onshore structures are reasonably foreseeable and proposed to be located in the geographic analysis area for land use and coastal infrastructure.	See Section 3.14.1.1 for analysis of onshore impacts. Offshore cable activities would not impact onshore land use or infrastructure.	See Sections 3.14.2.2 and 3.14.2.3 for analysis of onshore impacts. Offshore cable activities would not impact onshore land use or infrastructure.
Noise	Ongoing noise from construction occurs frequently near the shores of populated areas in New England and the mid-Atlantic region but infrequently offshore. Noise from construction near shorelines is expected to gradually increase over the next 30 years in line with human population growth along the coast of the geographic analysis area. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary.	No future activities were identified within the geographic analysis area other than ongoing activities.	See Section 3.14.1.1 for analysis.	See Sections 3.14.2.2 and 3.14.2.3 for analysis of impacts.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. The MCT at the Port of New Bedford is a completed facility developed by the port specifically to support the construction of offshore wind facilities.	Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size.	Various ports would be improved to support future offshore wind projects (see Appendix E). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Therefore, ports would experience long-term beneficial impacts such as greater economic activity and increased employment due to demand for vessel maintenance services and related supplies; vessel berthing, loading and unloading; warehousing and fabrication facilities for offshore wind components; and other business activity related to offshore wind. State and local agencies would be responsible for minimizing the potential adverse impacts of these future port expansions by managing port resources and traffic control to ensure continued access to ports and adjacent land uses. There could be increased traffic and noise associated with increased port use that could impact land uses by increasing congestion and noise. However, all traffic, noise, and other adverse impacts would be under regulatory thresholds as ports would be required to comply with local land use and zoning regulations. On this basis, the effects of port	**Offshore:** Land uses impacted by the construction of offshore components would include chosen port facilities used for shipping, storing, and fabricating Project components and for crew transfer, cargo logistics, and storage. Revolution Wind would use one or more ports to offload shipments of components, prepare them for installation, and load components onto vessels for delivery and installation. Selected ports could require improvements or upgrades to meet Project needs (see Table 3.3.10-1 of the COP), but no specific port improvements have been proposed as part of the Proposed Action. The COP states that to the extent that upgrades or modifications at an existing port facility could occur, Revolution Wind expects that those upgrades or modifications would serve to support the U.S. offshore wind industry in general. This is especially true as a number of states continue to procure, support, and fund such development. Thus, whether or not upgrades are required, port facilities are expected to serve multiple offshore wind projects and potentially also offshore wind-related and other maritime industries. BOEM (2016) analyzed potential impacts to ports that could require upgrades to accommodate offshore wind projects or that are in the process of completing upgrades in anticipation of increased port use associated with

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			utilization on land use under the No Action Alternative would be long term **negligible** adverse.	offshore wind projects. BOEM noted that land use and transportation impacts primarily include land-based space conflicts with current or planned uses of adjacent areas and landside traffic delays or conflicts associated with construction. BOEM (2016) also identified potential water-based space conflicts with other uses of port waterways such as dredging, pile driving, and fill placement. The ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors. Therefore, it is expected that port improvements or upgrades would be subject to local zoning and land use regulations and that any upgrades to ports would undergo independent permitting and regulatory compliance processes. The development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects; however, no specific port improvements are identified as part of the Project. All future port improvements would be subject to independent environmental permitting and regulatory review and would be consistent with local land use and zoning regulations. As such, any future port improvements supporting offshore wind development would be consistent with, and therefore would not hinder, other nearby land use or use of coastal infrastructure. Overall, construction and installation of offshore components would have minor beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment. Improvements such as road widening and signalization would provide transportation flow benefits over the long term. Because port expansion and upgrades are not part of the Proposed Action and would undergo separate permitting and regulatory review, there would be a negligible adverse port utilization impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action. Alternatives C through F would slightly reduce impacts to port utilization due to reduction of the number of WTGs and possible reduction of miles of IAC. However, impacts would be similar to the Proposed Action: **negligible** adverse. Offshore O&M facilities would include the RWEC, IAC, OSS interconnection cable, and OSS electrical components. While these offshore components would tie

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				into onshore Project components that could affect land use, the offshore activities and facilities themselves would not directly impact land use. Offshore facilities that tie into onshore facilities could result in increased activity within any of the listed onshore port areas zoned for business and industrial uses. However, this would reinforce the designated land use and provide a source of investment in the coastal infrastructure. Activities at ports, as in the preceding paragraph, would be consistent with the existing and designated uses at other ports and would comply with local zoning and land use regulations. Therefore, there would be a long-term **minor** beneficial and a **negligible** adverse port utilization impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action. Impacts would be similar for Alternatives C through F, although slightly reduced, so the impact determination would be the same as the Proposed Action. Port upgrades and vessel activity associated with the Proposed Action could result in incremental impacts through an increase in economic and employment opportunities as well as reduced port access, increased delays and congestion, or increased collision risk. Project port activity and upgrades (via dredging and in-water work) could also coincide with other forecasted projects. Quonset Point is scheduled to undergo remediation at the former NIKE Battery PR-58 and Disaster Village Training Area in 2021. In late 2020, the Rhode Island congressional delegation and the general treasurer joined the Rhode Island Department of Environmental Management in launching a $5.2 million project to make improvements at the Port of Galilee. The project would be located at the North Bulkhead section of the port where heavy-duty commercial fishing piers would be demolished and replaced, bulkhead asphalt repaired, and electrical supply upgraded (Block Island Times 2020). If the Port of Galilee is chosen to support Revolution Wind O&M activities, there would be no Project-related upgrades at the Port of Galilee. Port Jefferson has completed a master plan and an upper port revitalization plan, which is a blight study and urban renewal plan pursuant to New York State law. It involved rezoning certain areas and supporting major housing and mixed-use projects within the town (Village of Port Jefferson 2019). No specific non-Project improvements are proposed for Montauk Harbor, but NYSERDA issued an offshore wind master plan that notes Montauk Harbor as having the potential to be used or developed into

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				facilities capable of supporting offshore wind projects (NYSERDA 2017). Port activities could be delayed or area transportation routes could experience longer delays as a result of the overlap in construction activities. All activities would, however, be in accordance with land use goals and plans and would be subject to local land use and zoning regulations. Construction and operations improvements associated with the Project and other offshore wind energy development would occur within the boundaries of existing port facilities or repurposed industrial facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for development of waterfront infrastructure as well as economic opportunities (see Section 3.11). State and local agencies would also be responsible for minimizing the impacts of these future development plans by ensuring continued access to ports and adjacent land uses and minimizing or avoiding noise, air quality, and other impacts on nearby neighborhoods. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Proposed Action would have **negligible** adverse cumulative impacts on land use and coastal infrastructure. Alternatives C through F would slightly reduce impacts to port utilization, but impacts would remain the same as the Proposed Action: **negligible** adverse.
				Onshore: The Project is evaluating the use of the Port of Davisville at Quonset Point, Port of Galilee, Port Jefferson, and Port of Montauk to support O&M of the Project (see Table 3.3-24 in the COP). O&M buildings at or near some or all of these ports would be used for wind farm monitoring and equipment storage for multiple offshore wind projects—the RWF, SFWF, and Sunrise Wind Farm—and as such have utility that is independent of the Project. If the Port of Galilee or Port of Brooklyn are chosen as O&M facility locations, use of these ports would be limited to existing facilities maintained by these ports. Use of the other ports listed above would include using existing facilities as well as constructing additional facilities to support the RWF and other wind farms. An existing upland building, called the Research Way O&M Building, is located approximately 6 miles from Port Jefferson at 22 Research Way in Setauket-East Setauket, New York. It is located within an office park that also hosts technology companies and health care providers among other businesses. The building was recently purchased by Northeast Offshore, LLC, and internal

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				upgrades to establish office and warehouse space are planned. The planned work requires no governmental authorizations other than local building permits and would consist entirely of interior renovations to create workspaces. No external modifications or expansions are planned other than any necessary repairs to maintain the existing external appearance. The only other external planned work being discussed is maintenance of the parking lot, landscaping, and, potentially, signage. The Research Way facility would also be capable of serving multiple projects as well as general Orsted and Eversource business needs. A new building with up to 1,000 square feet of office space and up to 6,000 square feet of equipment storage would be constructed at the Port of Montauk. This facility could also serve as an O&M base for multiple offshore wind projects. The ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors. Activities associated with onshore construction of the Project would generate noise, vibration, and vehicular traffic and would temporarily alter views at one or more ports listed in Table 3.3.10-1 of the COP. Port improvements would result in combustion emissions from construction vehicles and equipment and could result in fugitive particulate emissions from soil movement. These impacts would be typical for construction in and operation of industrial ports. Noise, vibration, vehicular traffic increases, and vehicular emission generation would be short term. Potential landside transportation impacts would be minimized through construction hour restrictions, improvements such as road widening and signalization, and appropriate route selection (BOEM 2016). Activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities, would not hinder other nearby land use or use of coastal infrastructure, and would comply with local land use and zoning regulations. Overall, construction and installation of onshore components would have **minor** beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and port improvements and/or redevelopment. Improvements such as road widening and signalization would provide transportation flow benefits over the long term. Alternatives B through F include identical onshore facilities and activities and impacts.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
				Project O&M would involve routine daily activities at O&M facilities that are consistent with the zoned uses for those specific parcels. O&M facilities would include offices, warehouses, and associated accessory uses, which are consistent with the range of land uses associated with the ports listed in Table 3.3.10-1 of the COP. The increased activity within any of the listed port areas zoned for business and industrial uses would reinforce the designated land use and provide a source of investment in the coastal infrastructure. O&M activities would be limited to temporary, periodic use of vehicles and equipment; associated impacts would be consistent with zoned and designated uses for commercial and industrial port facilities. The presence of O&M facilities and related O&M activities would contribute to the economic vitality of ports. O&M of onshore components would therefore have minor beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment that would benefit other projects and port uses beyond those necessary for the Project (see Section 3.11). Therefore, there would be a long-term **minor** beneficial and a **negligible** adverse port utilization impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of Alternatives B through F. Development of an offshore wind industry on the mid-Atlantic OCS could incentivize the expansion or improvement of regional ports to support planned and future projects. Potential future activities could include upgrades to port facilities that would have long-term beneficial impacts to other users over a long time period. All future port improvements would be subject to independent environmental permitting and regulatory review and are not part of the Project. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on port utilization for Alternatives B through F.
Presence of structures: Viewshed	The only existing offshore structures within the offshore viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components would be limited to met towers. Marine activity would also occur within the offshore viewshed.	Future offshore wind activities would add 3,008 additional structures within the geographic analysis area. Future offshore wind activities would also result in onshore placement of structures. Structures would be built in accordance with state and local land use, zoning, and building regulations and therefore would have minimal land use and coastal infrastructure impacts. While the presence of additional onshore structures	**Offshore:** The installation and operation of up to 102 offshore structures for the Proposed Action and construction of the IAC, OSS-link cable, and RWEC would not result in any impacts to land use and coastal infrastructure because these impacts would occur offshore and would not overlap with onshore land uses. Therefore, there would be a **negligible** adverse impact from the presence of structures on land use and coastal

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			could impact land uses by reducing the amount of land available for other uses and generating short-term construction impacts, all structures would be built in accordance with state and local zoning and building regulations and would therefore have a minimal impact on land use and coastal infrastructure. On this basis, the effects of the presence of structures on land use under the No Action Alternative would be long term **negligible** adverse.	infrastructure from O&M and decommissioning of offshore elements of Alternatives B through F. Similarly, when considered in combination with past, present, and other reasonably foreseeable projects, the Proposed Action would have no effect on land use and coastal infrastructure; therefore, the cumulative impact would be **negligible** adverse. Alternatives C through F would result in incrementally smaller impacts, but not measurably reduce land use and coastal infrastructure impacts compared to the Proposed Action.
				Onshore: Onshore structures that would be constructed as part of the Project include the onshore transmission cable, ICF, and OnSS. The OnSS would require temporary disturbance (construction footprint) of up to 7.1 acres to facilitate construction. This includes an operational footprint of 3.8 acres. The ICF would require a temporary construction footprint of approximately 4.0 acres, which includes the 1.6-acre operational footprint. The ICF would be constructed adjacent to the existing Davisville Substation, in the zoned Quonset Business Park District. Installation of the ICF could increase visibility of the existing substation to nearby residences along Camp Avenue. However, construction would take place adjacent to the existing Davisville Substation, in lots surrounded by mature trees. Construction activities associated with onshore facilities is expected to take approximately 1 year and includes clearing and grading, excavating, installing foundations, and constructing the facility. There are no nighttime visually sensitive areas (public parks, beaches, or other public recreational facilities) near the OnSS and ICF that would be impacted by nighttime construction lighting (see Section 3.20). The visual impacts of the ICF would be minimized through the installation of vegetation to provide year-round screening from nearby Camp Avenue, Circuit Drive, and Roger Williams Way; appropriate substation siting; low-profile design; and minimal lighting, all of which would be directed downward (vhb 2021). As designed, the interconnection facility would generate sound below existing, ambient sound levels (vhb 2022). According to federal, state, and local noise standards, there would be no impact as a result of the operation of the ICF. All Project-related construction would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				Therefore, the presence of structures would result in a **negligible** adverse impact on land use and coastal infrastructure from construction and installation of onshore elements of all Project alternatives. O&M activities would include periodic inspections and repairs at the ICF and cable access manholes, which would require minimal use of worker vehicles and construction equipment. Periodic maintenance and repairs would have temporary impacts on access to adjacent land uses. All onshore structures that are part of Alternatives B through F and any necessary modifications to structures would be consistent with land use and zoning regulations. Therefore, the impact from the presence of structures on land use and coastal infrastructure would be **negligible** adverse. Reasonably foreseeable future actions would have similar impacts to Alternatives B through F in terms of the presence of structures. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on land use and coastal infrastructure for all Project alternatives.

Navigation and Vessel Traffic

No IPFs with solely negligible impacts were identified.

Table E2-14. Summary of Activities and the Associated Impact-Producing Factors for Navigation and Vessel Traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Anchoring	Larger commercial vessels (specifically tankers) sometimes anchor outside of major ports to transfer their cargo to smaller vessels for transport into port, an operation known as lightering. These anchors have deeper ground penetration and are under higher stresses. Smaller vessels (commercial fishing or recreational vessels) would anchor for fishing and other recreational activities. These activities cause temporary to short-term impacts on navigation in the immediate anchorage area. All vessels could anchor in an emergency scenario (such as power loss) if they lose power to prevent them from drifting and creating navigational hazards for other vessels or drifting into structures.	Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of a moderate increase commensurate with any increase in tankers visiting ports. Deep draft vessel visits to major port visits are expected to increase as well, increasing the potential for an emergency need to anchor and creating navigational hazards for other vessels. Recreational activity and commercial fishing activity would likely stay largely the same related to this IPF.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.	volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.		
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. There are two types of allisions that occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 35 years. Vessel allisions with non–offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
Presence of structures: Fish aggregation	Items in the water, such as ghost fishing gear, buoys, and energy platform foundations can create an artificial reef effect, aggregating fish. Recreational and commercial fishing can occur near the artificial reefs. Recreational fishing is more popular than commercial fishing near artificial reefs because commercial mobile fishing gear can risk snagging on the artificial reef structure.	Fishing near artificial reefs is not expected to change meaningfully over the next 35 years.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is made more complex as the vessels need to avoid both the structure and each other.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 35 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. The presence of navigation hazards is expected to continue at or near current levels.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
Presence of structures: Space use conflicts	Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities.	Reasonably foreseeable activities (non–offshore wind) would not result in additional offshore structures.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
New cable emplacement/ maintenance	Within the geographic analysis area for navigation and vessel traffic, existing cables could require access for maintenance activities. Infrequent cable maintenance activities could cause temporary increases in vessel traffic and navigational complexity.	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 35 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.
Traffic: Aircraft, vessels, collisions	See Table E2-15 (Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Military and National Security Uses) for a discussion of search and rescue (SAR) aircraft and vessels with respect to traffic. SAR helicopters are the main aircraft that could be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.	SAR operations could be expected to increase with any increase in vessel traffic. As noted in Table E2-15, no future non–offshore wind stationary structures were identified within the offshore analysis area. Therefore, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations.	See Section 3.16.1.1 for analysis.	See Sections 3.16.2.2 and 3.16.2.3 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	See also the sub-IPF for Presence of structures: Navigation hazard	See also the sub-IPF for Presence of structures: Navigation hazard		

Other Uses: Military and National Security

Table E2-15. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Military and National Security Uses

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities. Impacts are unlikely to affect military and national security uses.	Fuels and oils would be required for construction, installation, O&M, and decommissioning of future offshore wind activities. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future offshore wind projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future offshore wind activities during all phases of project construction would generally be localized and short term, resulting in little change to water quality. Therefore, this IPF would have a **negligible** adverse impact on military and national security uses because there would be no effect on this resource.	**Offshore:** Fuels and oils would be required for offshore construction and installation equipment, vessels, and infrastructure over the 18-month construction period. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Therefore, this IPF would have a **negligible** adverse impact on military and national security uses. Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in associated vessel and equipment use. This decrease in WTGs would result in a reduction of possible accidental releases and discharges, but the level of impact would not measurably change relative to the Proposed Action. **Onshore:** Same as offshore impacts.
Anchoring	Impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
New cable emplacement/maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently, and would generate short-term disturbances.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Light	Impacts from lighting on military and national security include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	substantially more light on an ongoing basis. Impacts are expected to be minimal.	traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population growth and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts.		
Noise	Noise impacts are expected from construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	While future offshore wind activities without the Proposed Action would result in construction and decommissioning noise and limited operational noise, noise is not expected to impact military and national security as all noise would be lower than regulatory thresholds and would occur in geographic areas in which the military does not typically operate. Therefore, the effects of noise on military and national security under the No Action Alternative would be **negligible** adverse.	**Offshore:** While construction and installation, O&M and decommissioning of offshore elements of the Proposed Action would result in construction noise, noise is not expected to impact military and national security as all noise would be lower than regulatory thresholds. Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in noise associated with vessel and equipment use, but otherwise, the level of impact would not measurably change relative to the Proposed Action. Therefore, the effects of noise on military and national security under Alternatives B through F would be **negligible** adverse. The Project combined with reasonably foreseeable future actions would result in an increase in construction and decommissioning noise in the RI/MA WEA. However, noise impacts would be distributed across a large geographic area and would not likely occur at the same time. Noise is not anticipated to impact military or national security. Therefore, because Project activities combined with reasonably foreseeable activities would result in a minimal increase in noise offshore that is not expected to impact military and national security uses, the cumulative impacts would be **negligible** adverse. **Onshore:** Same as offshore impacts.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause potential conflicts with military aircraft and vessels.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in port usage by some fishing or recreational vessel operators, and changes in navigation patterns.	There could be a very minimal increase in vessel use at ports associated with the No Action Alternative. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action, which could result in delays and congestion at ports that could lead to potential conflicts with military aircraft and vessels due to increased activity in the vicinity of the airports listed in the Affected Environment. Port improvements and construction activities in or near ports could require alteration of navigation patterns at nearby airports, which could impact military uses. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists	**Offshore:** Alternatives B through F would require construction and O&M vessels, which could result in minor delays and congestion at ports. This could lead to potential conflicts with military aircraft and vessels due to increased port activity. Although no port improvements are currently planned as part of Alternatives B through F, if port upgrades are required, port improvements and construction activities in or near ports could require alteration of navigation patterns at nearby airports, which could impact military uses. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction and O&M is completed. Vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. However, port utilization is not expected to increase beyond what is currently allowed under land use regulations. Therefore, port utilization is expected to

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on military and national security.	have a **negligible** adverse effect on military and national security. Although Alternatives C through F would result in a slight reduction of port utilization due to a reduction of the number of WTGs and their associated IACs, impacts on this resource would be similar to the Proposed Action. Project activities combined with reasonably foreseeable activities would result in a minimal increase in port utilization that would be accounted for through port improvements and capacity planning. Therefore, the cumulative impacts of noise on military and national security would be **negligible** adverse.
				Onshore: Same as offshore impacts.
Presence of structures: Allisions	Existing stationary facilities that present allision risks include the five offshore wind turbines associated with the BIWF, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No additional non–offshore wind stationary structures were identified within the geographic analysis area. Stationary structures such as private or commercial docks could be added close to the shoreline.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Presence of structures: Fish aggregation	Existing stationary facilities that act as FADs include offshore wind turbines associated with the BIWF.	No future non–offshore wind additional stationary structures that would act as FADs were identified within the geographic analysis area.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Presence of structures: Navigation hazard	Existing stationary facilities within the geographic analysis area that present navigational hazards consist of the five WTGs in the BIWF; onshore wind turbines; communication towers; dock facilities; and other onshore and offshore commercial, industrial, and residential structures.	No future non–offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue, with additional proposed communications towers and onshore commercial, industrial, and residential developments.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Presence of structures: Space use conflicts	Existing stationary facilities within the geographic analysis area that present a navigational hazard include the five WTGs in the BIWF; onshore wind turbines; communication towers; dock facilities; and other onshore and offshore commercial, industrial, and residential structures.	No future non–offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue, with additional proposed communications towers and onshore commercial, industrial, and residential developments.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Presence of structures: Transmission cable infrastructure	Seven submarine cable corridors cross cumulative lease areas.	Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Traffic: Vessels, collisions	Current vessel traffic in the region is described in Section 3.16.1. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region is described in Section 3.16.1.	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.
Traffic: Aviation	Onshore and offshore military and national security use areas could have designated surface and subsurface boundaries and special use airspace. Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be	See Section 3.17.1.3 for analysis.	See Sections 3.17.2.4 and 3.17.2.9 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. Warning Area W-105A is a special use airspace area primarily used by the U.S. Air Force located offshore Massachusetts and Rhode Island, and overlapping the RI and MA lease areas.	expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.		
Climate Change	Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact military and national security-related aviation and air traffic due to more inclement weather incidents.	Sea level rise and storm severity/frequency would increase due to the effects of climate change.	Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact military and national security–related aviation and air traffic due to more inclement weather incidents. Future offshore wind activities could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts during construction. However, the construction of future offshore wind facilities could ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources, resulting in a net decrease in GHG emissions from energy generation. On this basis, the effects of climate change on military and national security under the No Action Alternative would be **negligible** adverse.	Similar to the No Action Alternative, the construction and installation, O&M, and decommissioning of Alternatives B through F could contribute to climate change impacts during construction. However, the Project could also ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources, resulting in a net decrease in GHG emissions from energy generation. On this basis, the effects of climate change on military and national security under Alternatives B through F would be **negligible** adverse.

Other Uses: Aviation and Air Traffic

Table E2-16. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Aviation and Air Traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges would be ongoing and anticipated to occur in low frequencies. This IPF would therefore not overlap with aviation and air traffic uses and areas.	No future activities were identified within the geographic analysis area other than ongoing activities.	Accidental releases and discharges would not overlap with aviation and air traffic uses and areas and therefore would result in a **negligible** adverse impact.	**Offshore:** The effects of this IPF from Alternatives B through F would not impact aviation and air traffic because accidental releases and discharges would not overlap with aviation and air traffic uses. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.
				Onshore: Same as offshore impacts.
Anchoring and new cable emplacement/maintenance	Anchoring activities would be ongoing and anticipated to occur in low frequencies. This IPF would therefore not overlap with aviation and air traffic uses and areas.	No future activities were identified within the geographic analysis area other than ongoing activities.	Future offshore wind activities would require adding new cables and maintaining them as part of future wind projects. The offshore effects of anchoring and new cable emplacement/maintenance would have no bearing on aviation or air traffic, as these uses do not overlap. Onshore construction and maintenance of cables associated with future offshore wind activities would occur in areas that are not likely to overlap with aviation uses. The use of onshore construction equipment would	**Offshore:** Onshore construction, maintenance, and decommissioning of cables associated with future offshore wind activities would occur in areas that are not likely to overlap with aviation uses. The use of onshore construction equipment would not interfere with air traffic. On this basis, the effects of anchoring and new cable emplacement/maintenance on aviation and air traffic under Alternatives B through F would be **negligible** adverse.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			not interfere with air traffic. On this basis, the effects of anchoring and new cable emplacement/maintenance on aviation and air traffic under the No Action Alternative would be **negligible** adverse.	**Onshore:** Same as offshore impacts.
Light	Impacts from lighting on aviation and air traffic include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts.	See Section 3.17.1.1 for analysis.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts.
Noise	Noise impacts are expected from construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Noise is not expected to impact aviation and air traffic.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	While future offshore wind activities without the Proposed Action would result in construction and decommissioning noise and limited operational noise, noise is not expected to impact aviation and air traffic. Therefore, the effects of noise on aviation and air traffic under the No Action Alternative would be **negligible** adverse.	**Offshore:** All Project-associated noise would comply with regulatory noise thresholds and noise is not expected to impact aviation and air traffic. Alternatives C through F could result in a slight reduction to construction and operational noise but otherwise would be similar to the Proposed Action. Therefore, the effects of noise on aviation and air traffic under Alternatives B through F would be **negligible** adverse. Reasonably foreseeable future actions would occur over a dispersed geographic area and would not generate noise high enough to impact aviation uses. Therefore, the cumulative impacts would also be **negligible** adverse.
				Onshore: There would be onshore noise impacts associated with the construction of Alternatives B through F. Construction would be limited to daylight hours, and noise impacts would consist of noise generated from heavy equipment performing clearing, grading, excavating, installing foundations, and heavy lifting of substation components. Noise modeling shows that noise is expected to remain below Town of North Kingstown noise ordinance levels. Because there is no permanent noise-generating equipment associated with the onshore transmission cable, operational noise of the underground cables is expected have no impacts to aviation and air traffic. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels; therefore, operational noise levels would not have an impact on aviation and air traffic. It is expected that reasonably foreseeable future actions would have similar noise impacts to Alternatives B through F. Therefore, impacts associated with the Project

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on aviation and air traffic.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause potential impacts to aviation and air traffic.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports.	See Section 3.17.1.1 for analysis.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts.
Presence of structures: Navigation hazard	Existing aboveground stationary facilities within the geographic analysis area that present navigational hazards include the five WTGs in the BIWF, onshore wind turbines, communication towers, dock facilities, and other onshore and offshore structures exceeding 200 feet in height.	No future non–offshore wind stationary structures were identified within the offshore analysis area. Onshore development activities are anticipated to continue with additional proposed communications towers.	See Section 3.17.1.1 for analysis.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts.
Presence of structures: Space use conflicts	Existing aboveground stationary facilities within the geographic analysis area that could cause space use conflicts for aircraft consist of the five WTGs associated with the BIWF, onshore wind turbines, communication towers, and other onshore and offshore structures exceeding 200 feet in height.	No future non–offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers.	See Section 3.17.1.1 for analysis.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts.
Traffic: Aviation	Onshore and offshore military and national security use areas could have designated surface and subsurface boundaries and special use airspace. Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments. Warning Area W-105A is a special use airspace area primarily used by the U.S. Air Force located offshore Massachusetts and Rhode Island, and overlapping the RI and MA lease areas.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	See Section 3.17.1.1 for analysis for offshore impacts. This IPF would not impact onshore uses.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts for offshore impacts. This IPF would not impact onshore uses.
Traffic: Vessels	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports, and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic.	See Section 3.17.1.1 for analysis.	See Sections 3.17.2.2 and 3.17.2.7 for analysis of impacts.
Climate change	Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could	Sea level rise and storm severity/frequency would increase due to the effects of climate change.	Future offshore wind activities could result in construction activities that increase GHG emissions. Increased GHG emissions could contribute to climate	**Offshore:** Alternatives B through F could result in GHG emissions during Project construction, O&M, and decommissioning phases as well as offset negative effects

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	impact military and national security–related aviation and air traffic due to more inclement weather incidents.		change impacts. Climate change has resulted in a measurable increase in annual precipitation on the East Coast, which could impact aviation and air traffic due to more inclement weather incidents. However, the construction of future offshore wind facilities would ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. On this basis, the effects of climate change on aviation and air traffic under the No Action Alternative would be **negligible** adverse.	of climate change by redistributing some of the East Coast's energy generation to renewable sources. Therefore, the effects of climate change on aviation and air traffic under Alternatives C through F would be **negligible** adverse.
				Onshore: Same as offshore impacts.

Other Uses: Cables and Pipelines

Table E2-17. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Cables and Pipelines

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities.	The effects of this IPF from the No Action Alternative would not impact undersea cables because accidental releases and discharges would result in water quality impacts that do not impact undersea cables. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore:** The effects of this IPF from Alternatives B through F would not impact undersea cables because accidental releases and discharges would result in water quality impacts that do not impact undersea cables. Alternatives C through F would require fewer construction, O&M, and decommissioning vessel trips, reducing the risk of accidental releases and discharges, but there would be no measurable change on effects between all Project alternatives. Therefore, this IPF would result in a **negligible** adverse impact and **negligible** adverse cumulative impact under Alternatives B through F because there would be no effect on this resource. **Onshore:** Same as offshore impacts.
Anchoring and new cable emplacement/maintenance	Impacts from this IPF occur due to ongoing military use and survey, commercial, and recreational activities. These disturbances would be limited to local areas but do not overlap with cables and pipeline activities.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term.	The presence of future offshore wind energy cables could preclude future submarine cable placement within any given development footprint, requiring future cables to route around these areas. However, the placement and presence of these cables would not prohibit the placement of additional cables and pipelines. Following standard industry procedures, cables and pipelines can be crossed without adverse impacts. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Impacts on submarine cables would be eliminated during decommissioning of offshore wind farms if export cables associated with those projects are removed.	**Offshore:** The installation of the RWEC would cross submarine cables that run through the regional waters. Most submarine cables pass through Green Hill, Rhode Island. In addition, there are NOAA nautical chart cable and pipeline areas that denote where such infrastructure could be located. Because Revolution Wind would use standard techniques during installation, O&M, and decommissioning to prevent damage to cables, adverse impacts would be **negligible** adverse. The effects of this IPF would be the same or slightly reduced from the Proposed Action under Alternatives C through F. Up to 4,209 miles of cables are expected to be installed between 2021 and 2030 in the RI/MA WEA as part of reasonably foreseeable future actions. However, the placement and presence of these cables would not

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
			Therefore, the effects of anchoring and new cable emplacement/maintenance on undersea cables under the No Action Alternative would be **negligible** adverse.	prohibit the placement of additional cables and pipelines. Impacts on undersea cables would be eliminated during decommissioning of offshore wind farms if export cables associated with those projects are removed. Therefore, Project activities combined with reasonably foreseeable activities would result in a **negligible** adverse impact on undersea cables.
				Onshore: Same as offshore impacts.
Light	Impacts from lighting include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Impacts are expected to be minimal.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time.	Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of vessel collisions during installation or maintenance of undersea cables. This would result in a general increase of lights in the geographic analysis area, which could have a small negative impact on vessels performing cable construction or maintenance by increasing navigational complexity. However, given that no new cables associated with non–wind energy actions are anticipated, the effects of light on undersea cable construction or maintenance under the No Action Alternative would be **negligible** adverse.	**Offshore:** Lighting for construction, operations, and decommissioning under all Project alternatives would not impact undersea cables because light has no impact on undersea cables. Alternatives C through F would result in smaller Project footprints and fewer lighted offshore structures than the Proposed Action, but the reduction of impacts would not be measurable. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.
				Onshore: Same as offshore impacts.
Noise	Ongoing noise from construction occurs frequently nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. Noise from construction near shorelines is expected to gradually increase over the next 30 years in line with human population growth along the coast of the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.	The effects of this IPF from the No Action Alternative would not impact undersea cables because noise has no impact on existing undersea cables or the construction or maintenance of undersea cables. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore:** Project construction, operations, and decommissioning noise would not impact undersea cables because noise has no impact on undersea cables. Alternatives C through F would result in smaller Project footprints and fewer offshore structures than the Proposed Action, but the reduction of impacts would not be measurable. This IPF would result in **negligible** adverse impacts because there would be no effect on this resource.
				Onshore: Same as offshore impacts.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage. The increased activity could cause potential navigational complexity.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.	There could be a very minimal increase in vessel use at ports associated with the No Action Alternative. Vessels used for undersea cable installation and maintenance of existing or future non–wind energy cables could conflict with vessels used for construction, O&M and decommissioning of future offshore wind actions by increasing congestion and delays at ports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Port utilization is also not expected to	**Offshore:** Vessels used for the Project could impact installation and O&M of other undersea cables by increasing congestion and delays at ports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Port utilization is also not expected to increase beyond what is currently allowed under land use regulations; therefore, port utilization that supports Alternatives B through F would have **negligible** adverse impacts on existing and future undersea cables.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			increase beyond what is currently allowed under land use regulations; therefore, port utilization that supports future offshore wind activities would not impact the construction, operation, and maintenance of existing and future undersea cables. Therefore, there would be **negligible** adverse impacts from increased port utilization for the construction, operation, and maintenance of existing and future undersea cables.	**Onshore:** Same as offshore impacts.
Presence of structures: Allisions and navigation hazards	Structures within and near the geographic analysis area that pose potential allision hazards include the five BIWF WTGs; met buoys associated with offshore wind lease areas; and shoreline developments such as docks, ports, and other commercial, industrial, and residential structures.	Reasonably foreseeable non–offshore wind structures that could affect submarine cables have not been identified in the geographic analysis area.	See Section 3.17.1.5 for analysis.	See Sections 3.17.2.6 and 3.17.2.11 for analysis of impacts.
Presence of structures: Space use conflicts	Submarine cables cross the geographic analysis area and are associated with a larger network of submarine cables that are present along the OCS.	Reasonably foreseeable non–offshore wind structures have not been identified in the geographic analysis area.	See Section 3.17.1.5 for analysis.	See Sections 3.17.2.6 and 3.17.2.11 for analysis of impacts.
Presence of structures: Transmission cable infrastructure	Seven submarine cable corridors cross cumulative lease areas.	Reasonably foreseeable non–offshore wind structures have not been identified in the geographic analysis area.	See Section 3.17.1.5 for analysis.	See Sections 3.17.2.6 and 3.17.2.11 for analysis of impacts.
Traffic: Aviation	Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	Future offshore wind activities could result in increased air traffic due to the use of helicopters and other aircraft during construction, installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind activities would result in a small increase in flight traffic. Future offshore wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on undersea cables would be **negligible** adverse.	**Offshore:** Aviation and air traffic impacts from offshore construction, O&M, and decommissioning of the Project would not coincide with areas in which undersea cables are located. While Alternatives C through F would require fewer Project-related helicopter trips due to the reduction in number of offshore elements, the effects of this IPF on undersea cables and pipelines would be **negligible** adverse under all Project alternatives. **Onshore:** Same as offshore impacts.
Traffic: Vessels	No substantial changes are anticipated to vessel traffic volumes. The geographic analysis area would continue to have numerous ports, and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic.	See Section 3.17.1.5 for analysis.	See Sections 3.17.2.6 and 3.17.2.11 for analysis of impacts.
Climate change	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise.	No future activities were identified within the geographic analysis area other than ongoing activities.	The effects of this IPF from the No Action Alternative would not impact undersea cables because undersea cables and cable placement are not impacted by ongoing or future climate change impacts. This IPF would result in	**Offshore:** The impacts of this IPF would not impact undersea cables for Alternatives B through F because climate change impacts do not have a measurable effect on undersea cables. This IPF would result in **negligible**

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			a **negligible** adverse impact because there would be no effect on this resource.	adverse impacts because there would be no effect on this resource.
				Same as offshore impacts.

Other Uses: Radar Systems

Table E2-18. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Radar Systems

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities.	The effects of this IPF from the No Action Alternative would not impact land-based radar because accidental releases and discharges would be limited in scope to the offshore and onshore areas occupied by future offshore wind activities and would not result in increased radar interference. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore:** The effects of this IPF from Alternatives B through F would not impact land-based radar because accidental releases and discharges from the Project would be limited to the areas in which construction, O&M, and decommissioning are taking place and would not be located near land-based radar systems, nor would land-based radar systems be affected by accidental releases and discharges. While Alternatives C through F would require fewer Project-associated vessel trips, incrementally reducing the risk of accidental releases and discharges, the effects under all Project alternatives would be similar. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.
				Onshore: Same as offshore impacts.
Anchoring and new cable emplacement/maintenance	Impacts from this IPF occur due to ongoing military use and survey, commercial, and recreational activities. These disturbances would be limited to local areas and are not expected to increase radar interference.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term.	Offshore energy facility new cable emplacement and maintenance of cables would involve increased vessel traffic, which could create increased radar interference. However, the impacts are expected to be small and short term because anchoring and cable emplacement/maintenance activities are short-term activities that require few vessels. On this basis, the effects of anchoring and new cable emplacement/maintenance on land-based radar under the No Action Alternative would be **negligible** adverse.	**Offshore:** Cable construction associated with Alternatives B through F could result in increased vessel traffic, which could create increased radar interference. However, the impacts are expected to be small and short term in duration because anchoring and cable emplacement activities are short term and infrequent activities that require few vessels. Impacts under Alternatives C through F would be slightly reduced due to smaller Project footprints and fewer offshore structures, but effects would be similar under all Project alternatives. On this basis, the effects of anchoring and new cable emplacement/maintenance on land-based radar under Alternatives B through F during Project construction, O&M, and decommissioning would be **negligible** adverse. Up to 2,148 acres could be affected by anchoring/mooring activities during offshore wind energy development within the geographic analysis area in addition to Alternatives B through F. However, the impacts are expected to be small and short term. Therefore, the cumulative impacts associated with Alternatives B through F when combined with past,

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse.
				Onshore: Same as offshore impacts.
Light	Impacts from lighting include light associated with military, commercial, or construction vessel traffic but are not expected to result in radar interference.	No future activities were identified within the geographic analysis area other than ongoing activities.	The effects of this IPF from the No Action Alternative would not impact land-based radar because light from future offshore wind activities would not affect radar systems. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore:** Light from construction, O&M, and decommissioning of Alternatives B through F would not affect radar systems. This IPF would result in a **negligible** adverse effect on the operation and effectiveness of land-based radar systems because there would be no effect on this resource. The cumulative effects of this IPF do not impact land-based radar and are therefore **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
				Onshore: Same as offshore impacts.
Noise	Noise impacts are expected from construction and vessel traffic but are not expected to result in radar interference.	No future activities were identified within the geographic analysis area other than ongoing activities.	The effects of this IPF from the No Action Alternative would not impact land-based radar because noise from future offshore wind activities would not affect radar systems. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore:** Airborne noise from construction of the Proposed Action would have a **negligible** adverse effect on land-based radar systems because noise from future offshore wind activities would not affect radar systems. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
				Onshore: Same as offshore impacts.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. Impacts are expected to be minimal.			**Offshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels associated with the Proposed Action would increase, which could result in vessel congestion at ports, but this would be a short-term effect. An increase in vessel traffic could result in increased radar interference. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Because port utilization is not expected to increase beyond what is currently allowed under land use regulations, port utilization is expected to have a **negligible** adverse effect on land-based radar. Although Alternatives C through F

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. **Onshore:** Same as offshore impacts.
Presence of structures: Navigation hazards	Wind developments in the direct line-of-sight with, or extremely close to, radar systems can cause clutter and interference. Existing wind developments in the area include scattered onshore wind turbines and five WTGs in the BIWF.	Reasonably foreseeable non–offshore wind structures proposed for construction in the lease areas that could affect radar systems have not been identified.	See Section 3.17.1.2 for analysis.	See Sections 3.17.2.3 and 3.17.2.8 for analysis of impacts.
Traffic: Aviation	Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction, installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind activities would result in a small increase in flight traffic. Future offshore wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on land-based radar would be **negligible** adverse.	**Offshore:** The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. Two helicopter trips per day are anticipated per day during construction, with a total flight time of 8,832 hours, or approximately 4,416 hours per year over the 2-year construction period. Extrapolating from nationwide statistics cited in Section 3.17.2.2.1, helicopter flights for Project construction would represent a 63% increase in annual helicopter flight hours and a 7% increase in general aviation flight hours in the geographic analysis area during Project construction. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the geographic analysis area. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. The addition of one to two helicopter trips per day would have a **negligible** adverse impact on land-based radar in the geographic analysis area. The Proposed Action would result in an average 1% increase in general aviation in the geographic analysis area over a 32-year construction, installation, O&M, and decommissioning period, with reasonably foreseeable future actions anticipated to have similar impacts in scale and duration. On the basis of a 1% increase in general aviation in the geographic analysis area, the cumulative effects of this IPF on land based radar would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. **Onshore:** Same as offshore impacts.
Traffic: Vessels	No substantial changes are anticipated to vessel traffic volumes. The geographic analysis area would continue to	Absent other information, and because total vessel transits in the area have remained relatively stable since	See Section 3.17.1.2 for analysis.	See Sections 3.17.2.3 and 3.17.2.8 for analysis of impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	have numerous ports and extensive marine traffic related to shipping, fishing, and recreation.	2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic		
Climate change				**Offshore:** The Proposed Action could result in construction, O&M and decommissioning activities that increase GHG emissions. Increased GHG emissions could contribute to climate change impacts. However, the beneficial impacts to climate change would be increased due shifting energy sources from nonrenewable to renewable sources, which would help offset additional future additional negative effects of climate change. Climate change impacts from the Proposed Action would not impact land-based radar because the construction, operation, and maintenance of land-based radar systems is not affected by climate change that can be linked to the Proposed Action. Therefore, the effects of climate change on land-based radar under the Proposed Action would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
				Onshore: Same as offshore impacts.

Other Uses: Scientific Research and Surveys

Table E2-19. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Scientific Research and Surveys

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities.	Fuels and oils would be required for construction and installation, O&M, and decommissioning of future offshore wind activities. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future offshore wind projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future offshore wind activities during all phases of project	**Offshore:** Fuels and oils would be required for Proposed Action offshore construction and installation, O&M, and decommissioning equipment, vessels, and infrastructure. In the event of a spill or release, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). However, water quality could be temporarily impacted in the vicinity of the spill. This could alter results of scientific surveys that are water quality dependent. An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup,

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			construction would generally be localized and short term, resulting in little change to water quality. In the event of a spill, water quality could be temporarily impacted, which could alter water quality in the vicinity of the spill. This could alter results of scientific surveys that are water quality dependent. However, an OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Therefore, the effects of accidental releases and discharges on scientific research and surveys from future offshore wind activities without the Proposed Action would be **negligible** adverse.	and other measures that would help minimize impacts on water quality from spills. Therefore, the effects of accidental releases and discharges on scientific research and surveys from the Proposed Action would be **negligible** adverse. Reasonably foreseeable activities could also result in accidental releases and discharges, although those projects would be subject to the same minimization measures as the RWF. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse. **Onshore:** The construction and installation of onshore Project components would not impact scientific research and surveys because accidental releases and discharges would be limited to an onshore construction footprint and scientific research and surveys would occur offshore. This IPF would result in a **negligible** adverse impact.
Anchoring and new cable emplacement/maintenance	Impacts from this IPF occur due to ongoing military use and survey, commercial, and recreational activities. These activities potentially increase navigational complexity and vessel traffic but are expected to minimally impact scientific research and surveys.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term.	See Section 3.17.1.4 for analysis.	See Sections 3.17.2.5 and 3.17.2.10 for analysis of impacts.
Light	Impacts from lighting on scientific research and surveys include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis. Impacts are expected to be minimal.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts.	See Section 3.17.1.4 for analysis.	See Sections 3.17.2.5 and 3.17.2.10 for analysis of impacts.
Noise	Noise impacts are expected from construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when	Construction and installation of future offshore wind projects would result in temporary increases in construction and decommissioning noise. There would be low levels of operational noise as part of future offshore wind projects. Construction noise has the potential to	**Offshore and Onshore:** Construction and installation of the Proposed Action would result in a temporary increase in construction noise. O&M and decommissioning of the Proposed Action would result in long-term, permanent low levels of operational noise and temporary noise

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
	are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	implemented. The number and location of such routes are uncertain.	interfere with scientific research and surveys if such surveys are sensitive to noise impacts. However, construction noise levels are expected to be below regulatory thresholds and would be short term in duration. Operational noise impacts are expected to be very minimal and would also be below regulatory thresholds. Therefore, noise would have a **negligible** adverse impact on scientific research and surveys.	during decommissioning. These noise sources have the potential to interfere with scientific research and surveys if such surveys are sensitive to noise impacts. However, because NMFS anticipates that construction and O&M of the Project would result in curtailment of scientific research and surveys in the geographic analysis area, noise would have a **negligible** adverse impact on scientific research and surveys. Reasonably foreseeable activities would also increase noise in the area, which could interfere with scientific research and surveys. However, reasonably foreseeable future actions would also result in curtailment of scientific research and surveys in the RI/MA WEA as additional wind projects are constructed. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage. The increased activity could increase navigational complexity and vessel traffic.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.	Various ports would be improved to support future offshore wind development within the geographic analysis area (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action, which could result in delays and congestion at ports that could lead to potential conflicts with scientific research vessels due to increased port activity. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on scientific research and surveys.	**Offshore and Onshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Because port utilization is not expected to increase beyond what is currently allowed under land use regulations, port utilization that supports the Proposed Action would not impact scientific research and surveys. The number of construction and operational vessels would increase due to the Proposed Action, which could result in delays and congestion at ports that could lead to conflicts with scientific and research vessels. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on scientific research and surveys. Reasonably foreseeable future actions would also result in improvements at various ports to support future offshore wind projects (see Appendix E). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would also support

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				state strategic plans and local land use goals for the development of waterfront infrastructure. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area and include met buoys associated with site assessment activities, the five BIWC WTGs, and the two Coastal Virginia Offshore Wind (CVOW) WTGs. Other lease areas within the geographic analysis area are not yet developed and are in various stages of permitting.	Reasonably foreseeable non–offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.	See Section 3.17.1.4 for analysis.	See Sections 3.17.2.5 and 3.17.2.10 for analysis of impacts.
Traffic: Aviation	Military air traffic use the area and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind activities would result in a small increase in flight traffic. Future offshore wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on scientific research and surveys would be **negligible** adverse.	**Offshore and Onshore:** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the geographic analysis area. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the geographic analysis area. Please refer to Section 3.17 for analysis of the Project's construction and installation impacts. On the basis of the estimated increase in general aviation in the geographic analysis area, the effects of this IPF on scientific research and surveys under the Proposed Action would be **negligible** adverse, as the 7% increase in general aviation flight hours is not anticipated to impact air-based scientific research and surveys. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Traffic: Vessels	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports and extensive marine traffic related to shipping, fishing, and recreation.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic.	See Section 3.17.1.4 for analysis.	See Sections 3.17.2.5 and 3.17.2.10 for analysis of impacts.
Climate change	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise.	No future activities were identified within the geographic analysis area other than ongoing activities.	The ongoing effects of global climate change are expected to adversely affect many marine resources that are the subject ongoing survey and research efforts. Climate	**Offshore and Onshore:** The ongoing effects of global climate change are expected to adversely affect many marine resources that are the subject of ongoing survey

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			change could influence the planning and objectives of future scientific research and surveys but would not be expected to have a measurable effect on their implementation. Therefore, the effects of this IPF on scientific surveys and research would be **negligible** adverse.	and research efforts. Climate change could influence the planning and objectives of future scientific research and surveys but would not be expected to have a measurable effect on their implementation. Therefore, the effects of this IPF on scientific surveys and research would be **negligible** adverse. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.

Other Uses: Offshore Energy Uses

Affected environment: The OCS near the Project is currently experiencing active leasing and exploration in support of offshore wind energy development. Appendix E provides a list of known and anticipated offshore wind project and wind energy leases existing in the area that could lead to additional wind farm development. BOEM anticipates that developers could continue to propose offshore wind energy projects near the Project. The trend in increased wind farm development is anticipated to continue on the OCS. Several tidal energy projects have been implemented in the region and several are in the planning stages (see Appendix E of the COP). Tidal energy projects are typically located in the nearshore environment where landforms constrict tidal water passage, thereby increasing the velocity of tidal currents. These landforms exist in Narragansett Bay within the geographic analysis area; however, more detailed studies are needed to assess sites and determine economic viability for tidal energy uses (Robichaud et al. 2012). The Town of Edgartown has pursued developing a tidal energy site in the Muskeget Channel between Martha's Vineyard and Nantucket Island since 2007. It has operated as a test site and is usable for a wide range of testing. To date, over $2 million has been expended on resource, benthic, sediment, marine mammal, and other studies. The Bourne Tidal Test Site is located on Cape Cod Canal has been used for small tidal energy demonstration projects (New England Marine Energy Development System 2017).

Table E2-20. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Offshore Energy Uses

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue a similar trend to ongoing activities.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, accidental releases and discharge associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Anchoring and new cable emplacement/ maintenance	Impacts from this IPF occur due to ongoing military use and survey, commercial, and recreational activities. These activities potentially increase navigational complexity and vessel traffic.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, anchoring and new cable emplacement/maintenance associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Light	Impacts from lighting on offshore energy uses include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for standalone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, light impacts associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Noise	Noise impacts are expected from construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, noise associated with the RWF would not impact other offshore energy projects; This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause potential conflicts with other offshore energy uses.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in port usage by some fishing or recreational vessel operators, and changes in navigation patterns.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** If construction time frames with other offshore wind energy project overlap, there could be increased impacts to construction ports. Such impacts are not anticipated to affect construction timelines or alter the layouts of other renewable energy projects. For this reason, impacts are deemed **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area and include met buoys associated with site assessment activities, the five BIWF WTGs, and the two CVOW WTGs. Other lease areas within the geographic analysis area are not yet developed and are in various stages of permitting.	Reasonably foreseeable non–offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses.	**Offshore** Because offshore energy projects occur within individual lease areas, there would be no opportunity for the RWF to directly overlap or substantially interfere with other renewable energy projects. Therefore, this IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
			The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Traffic: Aviation	Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the geographic analysis area. O&M of the Proposed Action would result in a 0.01% increase in general aviation in the geographic analysis area. On the basis of the estimated increase in general aviation in the geographic analysis area, the effects of this IPF on offshore energy uses under the Proposed Action would be **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel and helicopter trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Traffic: Vessels	No substantial changes are anticipated to vessel traffic volumes. The geographic analysis area would continue to have numerous ports and extensive marine traffic related to shipping, fishing, and recreation.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** If construction or O&M time frames with other offshore wind energy project overlap, there could be increased navigation risk due to an increase in vessels in the geographic analysis area. Such impacts are not anticipated to affect construction timelines or alter the layouts of other renewable energy projects. For this reason, adverse impacts to other renewable energy projects are deemed **negligible** adverse for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Climate change	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise.	No future activities were identified within the geographic analysis area other than ongoing activities.	Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for stand-alone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs and uses. The reader is referred to other subsections for evaluation of the impacts of future offshore wind on marine uses.	**Offshore** Climate change impacts from the Proposed Action would not have a measurable effect on other offshore energy uses. This IPF would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.

Other Uses: Marine Mineral Resources and Dredged Material Disposal

Affected environment: BOEM's Marine Minerals Program manages non-energy minerals (primarily sand and gravel) in federal waters of the OCS and leases access to these resources to target shoreline erosion, beach renourishment, and restoration projects. At this time, there are no active or requested BOEM leases near the Project. The closest active BOEM lease is offshore of New Jersey, approximately 162 miles from the Project (BOEM 2018). One USACE borrow area (7A) is located offshore the town of Wainscott, in the vicinity of the RWEC.

The EPA designates and manages dredged material disposal sites, and the USACE permits the disposal of material in the sites. One active disposal site, the Rhode Island Sound Disposal Site, is located in the geographic analysis area approximately 3 miles east of Block Island, Rhode Island, and 10 miles west of the western boundary of the proposed RWF. No inactive or closed disposal sites are located in the geographic analysis area.

Increased shoreline erosion and coastal damage from storms has led to increased demand for sand resources in recent years.

Table E2-21. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Marine Mineral Resources and Dredged Material Disposal

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
Accidental releases and discharges	Accidental releases and discharges of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable line and pipeline laying activities.	Future accidental releases from offshore vessel usage, spills, and consumption would likely continue on a similar trend to ongoing activities.	Fuels and oils would be required for construction, installation, O&M, and decommissioning of future offshore wind projects. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. OSRPs would be required for all future offshore wind projects, which includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. Releases during construction of future offshore wind projects during all phases of project construction would generally be localized and short term, resulting in little change to water quality. In the event of a spill, marine mineral resources could potentially be impacted if such resources are susceptible to harm from contaminants, although the impacts would be very minimal. Therefore, the effects of vessel traffic on marine mineral resources and dredged material disposal under the No Action Alternative would be **negligible** adverse.	**Offshore and Onshore:** Fuels and oils would be required for Proposed Action offshore construction and installation, O&M, and decommissioning equipment, vessels, and infrastructure. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). An OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. A release during construction and installation of the Proposed Action would generally be localized and short term, resulting in little change to water quality. In the event of a spill, marine mineral resources could potentially be impacted if such resources are susceptible to harm from contaminants, although the impacts would be very minimal. Therefore, the effects of accidental releases and discharges on marine mineral resources and dredged material disposal under the Proposed Action would be **negligible** adverse. Reasonably foreseeable activities could also result in accidental releases and discharges, although those projects would be subject to the same minimization measures as the RWF. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
New cable emplacement/maintenance	Impacts from this IPF occur due to ongoing military use and survey, commercial, and recreational activities. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Impacts from anchoring could occur on a semiregular basis over the next 35 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Cable emplacement/maintenance would be infrequent and short term.	Future offshore cable installation could prevent future marine mineral extraction activities where project footprints overlap with extraction areas (typically within 8 miles of the shoreline). Therefore, only a portion of new offshore wind cables could potentially overlap extraction areas. Additionally, future projects would avoid identified borrow areas by consulting with the BOEM Marine Minerals Program and the USACE before approving offshore wind cable routes. Therefore, the effects of anchoring and new cable emplacement/maintenance under the No Action Alternative would be **negligible** adverse.	**Offshore and Onshore:** Because marine mineral resources and EPA dredged material disposal sites are located outside the geographic analysis area, Project anchoring and new cable emplacement/maintenance would result in a **negligible** adverse impact for the Proposed Action. Although Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall duration of construction activities relative to the Proposed Action, impacts would also be **negligible** adverse.
Light	Impacts from lighting on offshore energy uses include light associated with military, commercial, or construction vessel traffic. Ocean vessels have an array of lights, including navigational lights and deck lights. Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Future activities with the potential to result in lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the Northeast coast, with a slight increase due to population increase and development over time. Light from onshore structures is expected to gradually increase in line with human population growth along the coast, with minimal offshore impacts.	The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because light from future offshore wind activities would not affect marine mineral resources and dredged material disposal sites or activities. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore and Onshore:** The effects of this IPF from the Proposed Action to marine mineral resources and dredged material disposal would be **negligible** adverse because marine mineral resources and EPA dredged material disposal sites are located outside the geographic analysis area. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse.
Noise	Noise impacts are expected from construction and vessel traffic. Construction occurs frequently in nearshores of populated areas in New England and the Mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this IPF consist of commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Noise from construction near shorelines is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.	The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because noise from future offshore wind activities would not affect marine mineral resources and dredged material disposal. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore and Onshore:** The effects of this IPF from the Proposed Action to marine mineral resources and dredged material disposal would be **negligible** adverse because marine mineral resources and EPA dredged material disposal sites are located outside the geographic analysis area. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse.
Port utilization	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also experiencing continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in navigation patterns at nearby airports. The increased activity could cause increased navigational complexity and increased vessel traffic.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports and be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, changes in port usage by some fishing or recreational vessel operators, and changes in navigation patterns.	The effects of this IPF from the No Action Alternative would be **negligible** adverse on marine mineral resources and dredged material disposal because port utilization and potential increased vessel traffic resulting from the No Action Alternative are not expected to overlap with BOEM lease areas or EPA dredged material disposal sites.	**Offshore and Onshore:** Various ports would be improved to support the Proposed Action (see Section 3.14). The number of construction and maintenance vessels associated with the Proposed Action would increase which could result in vessel congestion at ports and potential collision risk with marine mineral resource or dredging vessels leaving or returning to ports, but this would be a minimal increase in vessel traffic. Also, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non–Offshore Wind Activities Intensity/Extent	Future Offshore Wind Activities Intensity/Extent	Action Alternatives B through F
				a **negligible** adverse effect on marine mineral resources and dredged material disposal. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse.
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area, and include met buoys associated with site assessment activities, the five BIWF WTGs, and the two CVOW WTGs. Other lease areas within the geographic analysis area are not yet developed and are in various stages of permitting.	Reasonably foreseeable non–offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.	Future offshore WTGs and OSSs could prevent future marine mineral extraction activities where project footprints overlap with extraction areas. However, this is unlikely as mineral extraction typically occurs within 8 miles of the shoreline. Therefore, there would be no risk of overlap with offshore structures, and their presence would have a **negligible** adverse effect on this resource.	**Offshore and Onshore:** There are no BOEM OCS sand and mineral lease areas and no identified sand resource blocks within the RWF and offshore RWEC; therefore, the Project and other reasonably foreseeable activities would have no impacts from structures or cable placement on these marine mineral resources. Similarly, because Project activities would not overlap any active dredged material disposal sites, the Project would have a **negligible** adverse impact on dredged material disposal. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse.
Traffic: Aviation	Military air traffic use the area, and government and other private aircraft could occasionally fly over the WEA for data collection and SAR operations. Aircraft are also used for scientific and academic surveys in marine environments.	Although no future non–offshore wind stationary structures were identified within the offshore analysis area, aircraft would continue to be used to conduct scientific research studies as well as wildlife monitoring and preconstruction surveys. SAR operations could be expected to increase with any increase in vessel traffic. However, because vessel traffic volume associated with future non–offshore wind is not expected to increase appreciably, neither should SAR operations. Commercial air traffic could also be expected to increase with current trends.	The effects of this IPF from the No Action Alternative would not impact marine mineral resources and dredged material disposal because aviation and air traffic are air- and land-based impacts that do not overlap with marine mineral resources and dredged material disposal uses. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Offshore and Onshore:** The effects of this IPF from the Proposed Action would not impact marine mineral resources and dredged material disposal because aviation and air traffic are air- and land-based impacts that would not impact underwater marine mineral resources and dredged material disposal. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint, duration of construction activities, but effects would also be **negligible** adverse.
Traffic: Vessels	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports and extensive marine traffic related to shipping, fishing, and recreation.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels and consistent generation of new vessel traffic by proposed barge routes and dredging demolition sites, this is still a relatively small adjustment when considering the whole of New England vessel traffic	Construction and operational vessel traffic from future offshore wind development is expected to increase. This could create conflicts with vessels undergoing marine mineral extraction and dredged disposal activities. However, because future offshore wind activities would take place within the RI/MA WEA and there is no marine mineral extraction or dredged material disposal areas that overlap, this impact is expected to be **negligible** adverse.	**Offshore and Onshore:** Construction and operational vessel traffic from the Proposed Action is expected to occur. This could create conflicts with vessels undergoing marine mineral extraction and dredged disposal activities. However, because the Proposed Action would take place within the RI-MA WEA and there is no marine mineral extraction or dredged material disposal areas that overlap, this impact is expected to be **negligible** adverse. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse.
Climate change	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters and sea level rise.	No future activities were identified within the geographic analysis area other than ongoing activities.	Future offshore wind activities without the Proposed Action could result in construction activities that increase GHG emissions. Increased GHG emissions could	**Offshore and Onshore:** The Proposed Action could result in offshore and onshore construction, O&M, and decommissioning activities that increase GHG emissions.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non–Offshore Wind Activities Intensity/Extent**	**Future Offshore Wind Activities Intensity/Extent**	**Action Alternatives B through F**
			contribute to climate change impacts. However, the construction of future offshore wind facilities would ultimately help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources. While negative impacts of climate change could affect marine mineral resources due to ocean acidification and other negative effects of climate change, future offshore wind activities without the Proposed Action are expected to help slow the negative impacts of climate change overall. Therefore, the effects of climate change under the No Action Alternative would be **negligible** adverse.	Increased GHG emissions could contribute to climate change impacts. However, O&M would help slow the negative effects of climate change by redistributing some of the East Coast's energy generation to renewable sources and reducing net GHG emissions in the area. While negative impacts of climate change could affect marine mineral resources due to ocean acidification and other negative effects of climate change, the Proposed Action is expected to help slow the negative impacts of climate change overall. Therefore, the effects of climate change under the Proposed Action by itself combined with other reasonably foreseeable projects would be **negligible** adverse. Alternatives C through F would require fewer construction vessel trips and WTGs and would reduce the overall footprint and duration of construction activities, but effects would also be **negligible** adverse.

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APPENDIX E2

Assessment of Resources with Minor (or Less) Impact Determinations

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Assessment of Resources with Minor Impact Determinations

This appendix provides an assessment of resources with minor or lower incremental impacts from implementation of the Proposed Action and other considered action alternatives. Because these sections were originally part of Chapter 3 of the Revolution Wind Farm and Revolution Wind Export Cable Project environmental impact statement (EIS), chapter and section naming and numbering were maintained for simplicity. All abbreviations and references for these sections are provided in the main EIS and Appendix B, respectively.

3.4 Air Quality

3.4.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Air Quality

Geographic analysis area: The spatial scale for analysis of potential effects to air quality encompasses 1) the airshed within 25 miles of the estimate Project center (corresponding to the OCS Lease Area) and 2) the airshed within 15.5 miles of onshore construction areas and ports that may be used for the Project. These two areas collectively make up the air quality geographic analysis area (GAA) (Figure 3.4-1) (see COP Figure 4.2.1-1). The air quality GAA encompasses the region subject to U.S. Environmental Protection Agency (EPA) review as part of an OCS permit for the Project under the Clean Air Act (CAA) and provides a reasonable buffer for the limited Project vessel and equipment emissions anticipated to occur within on-land construction areas and mustering port(s) outside of the OCS air permit area during proposed construction activities.

For the purposes of this analysis, the existing air quality conditions for each county within the GAA were evaluated. These counties comprise Providence and Washington Counties in Rhode Island, Suffolk and Kings Counties in New York, New London County in Connecticut, Gloucester County in New Jersey, Bristol and Dukes Counties in Massachusetts, Norfolk City in Virginia, and Baltimore County in Maryland.

Affected environment: The scope of the affected environment for the assessment of potential Project-related emissions and impacts to ambient air quality encompasses offshore areas and those states and counties where Project activities could occur. Project construction and O&M activities could use several regional existing port facilities as discussed in COP Section 3.3.10.1 and COP Table 3.3.10-1.

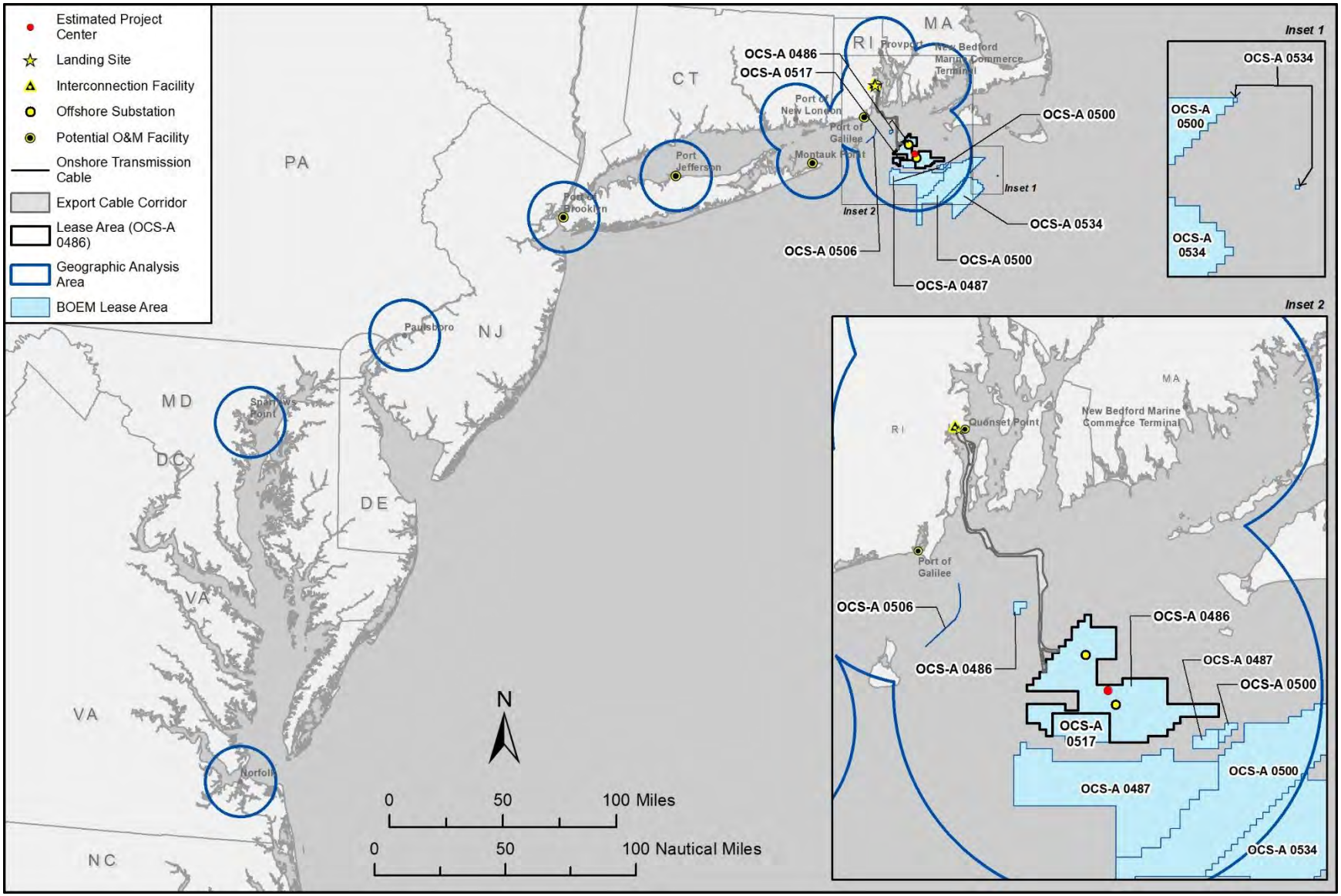

Figure 3.4-1. Geographic analysis area for air quality.

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by the EPA under the CAA (42 USC 7409) for criteria pollutants. The EPA has developed these standards to protect human health and welfare (primary standards) and provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (secondary standards). The criteria pollutants for which NAAQS have been established are carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter 10 microns or less (PM_{10}), particulate matter 2.5 microns or less ($PM_{2.5}$), nitrogen dioxide (NO_2), ozone (O_3), and lead. The EPA uses design values to designate and classify nonattainment areas. A design value is a statistic that describes pollutant levels at a given location so they can be compared to the NAAQS. Nonattainment occurs if any criteria air pollutant concentration design value exceeds its NAAQS. The CAA amendments of 1990 established the nonattainment designations as marginal, moderate, and serious. If a region is designated as nonattainment for a NAAQS, the CAA requires the state to develop a state implementation plan (SIP). A SIP provides for the implementation, maintenance, and enforcement of the NAAQS, and includes emission limitation and control measures to attain and maintain the NAAQS. The CAA also prohibits federal agencies from approving any activity that does not conform to a SIP, and this prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously nonattainment and for which a maintenance plan is required). Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has authority are outside of any nonattainment or maintenance area, and BOEM lacks any continuing program responsibility over activities potentially within any nonattainment area. Therefore BOEM's approval of the COP is not subject to the requirement to show conformity.

The areas of attainment for criterial pollutants within the GAA reported by the EPA (2021a) are in Table 3.4-1.

Table 3.4-1. U.S. Environmental Protection Agency Areas of Attainment for Criteria Pollutants

Location	EPA Reporting
Rhode Island, including all counties	Currently in attainment for all criteria pollutants.
Norfolk City, Virginia	Currently in attainment for all criteria pollutants.
Bristol County, Massachusetts	Currently in attainment for all criteria pollutants, but Dukes County is currently in marginal nonattainment for the 2008 8-hour O_3 standard.
Suffolk and Kings Counties, New York	Currently in serious nonattainment for the 2008 8-hour O^3 standard, moderate nonattainment for the 2015 8-hour O^3 standard, and in maintenance for the 2006 24-hour $PM_{2.5}$ standard.
Gloucester County, New Jersey	Currently in marginal nonattainment for both the 2008 8-hour O_3 standard and the 2015 8-hour O_3 standard and is also in maintenance for the 2006 24-hour $PM_{2.5}$ standard.
New London County, Connecticut	Currently in serious nonattainment for the 2008 8-hour O^3 standard and marginal nonattainment for the 2015 8-hour O_3 standard.
Baltimore County, Maryland	Currently in moderate nonattainment for the 2008 8-hour O^3 standard, marginal nonattainment for the 2015 8-hour O_3 standard, and nonattainment for the 2010 SO^2 standard.

Additional descriptions of air quality conditions for counties in nonattainment status are provided below.

Dukes County, Massachusetts, is an island community with a relatively low population density and little heavy industry. As is common in the northeastern region, non-road engines used for construction activities and on-road vehicle traffic are the main sources of nitrogen oxide (NO_X) in Dukes County (EPA 2020a). Vegetation sources and non-road engines are the primary volatile organic compound (VOC) emission sources in Dukes County. VOC and NO_X are precursor pollutants to the formation of O_3. Although the EPA currently classifies Dukes County as being in marginal nonattainment for the 2008 8-hour O_3 standard, ambient air quality monitors in Dukes County reported a steady decrease in O_3 levels from 2012 to 2015 (EPA 2021b). The EPA also recently (August 2018) designated Dukes County in attainment for the more stringent 2015 8-hour O_3 standard of 70.0 parts per billion (ppb) based on the 2014–2016 O_3 design value of 64.3 ppb (EPA 2021b). Recently, Dukes County reported an O_3 design value of 70.0 ppb for the 2016–2018 time period, 71.0 ppb for the 2017–2019 time period, and 66.0 ppb for the 2018–2020 time period (EPA 2021b).

Suffolk and Kings Counties, New York, have a high population density and Suffolk County sees the highest amount of commuter miles traveled in the New York metro area (EPA 2017). Suffolk County reported a steady decrease in O_3 concentration levels from 2017 to 2020 (EPA 2021b). The O_3 design value based on observations at the Riverhead air monitor in Suffolk County was 76.7 ppb during the 2015–2017 time period, 75.3 ppb for the 2016–2018 time period, 72.0 ppb for the 2017–2019 time period, and 70.0 ppb for the 2018– 2020 time period (EPA 2021b). There is no O_3 air monitor within Kings County. The nearby air monitor in Queens County reported a decrease in O_3 concentration levels from 2018 to 2020. The O_3 design value based on observations at the Queens College air monitor in Queens County was 74.0 during the 2015–2017 time period, 74.0 ppb for the 2016–2018 time period, 74.0 ppb for the 2017–2019 time period, and 70.0 ppb for the 2018–2020 time period (EPA 2021b). Thus, the EPA currently classifies Kings and Suffolk Counties as being in serious nonattainment for 8-hour O_3 according to the 2008 standard and in moderate nonattainment for the 2015 standard. Both counties are also in maintenance for the 2006 24-hour $PM_{2.5}$ standard. The EPA reports that on-road vehicles are the primary source of NO_X emissions emitted within Kings and Suffolk Counties; non-road engines are the second-largest source. Vegetation sources, solvent use in industry, off-highway engines, and on-road vehicles provide the most VOC emissions emitted within Kings and Suffolk Counties (EPA 2020a).

Gloucester County, New Jersey, has a much lower population density than Suffolk and Kings Counties, New York. Air quality within Gloucester County is affected by nearby Philadelphia. NO_X emissions in Gloucester County are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Storage and transport, vegetation, and solvent use are the primary sources of VOC emissions in Gloucester County (EPA 2020a). Although the EPA currently classifies Gloucester County as being in marginal nonattainment for the 2008 and 2015 8-hour O_3 standards, the ambient air quality monitor in Gloucester County reported a steady decrease in O_3 levels from 2018 to 2020 (EPA 2021b). Gloucester County reported an O_3 design value of 74.0 ppb for the 2015–2017 and 2016–2018 time periods, 72.0 ppb for the 2017–2019 time period, and 69.0 ppb for the 2018–2020 time period (EPA 2021b).

New London County, Connecticut, is a rural county with a low population density and small industrial bases. Neighboring metro areas outside this county heavily affect the air quality of the county in addition to regional sources. For this reason, changes to pollutant emissions by sources within the county have little

impact on the overall air quality trends. NO_X emissions in New London County are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Vegetation sources and solvent use are the primary sources of VOC emissions (EPA 2020a). Although the EPA currently classifies the county as being in serious nonattainment for the 2008 8-hour O_3 standard and marginal nonattainment for the 2015 8-hour O_3 standard, the ambient air quality monitor in the county reported a small decrease in O_3 levels from 2018 to 2020 (EPA 2021b). New London County reported an O_3 design value of 76.0 ppb for the 2015–2017 time period, 75.0 ppb for the 2016–2018 and the 2017–2019 time periods, and 73.0 ppb for the 2018–2020 time period (EPA 2021b).

Baltimore County, Maryland, has a population density three times greater than New London County, Connecticut. Although the EPA currently classifies Baltimore County as being in moderate nonattainment for the 2008 8-hour O_3 standard and marginal nonattainment for the 2015 8-hour O_3 standard, ambient air quality monitors in Baltimore County reported a steady decrease in O_3 levels from 2018 to 2020 (EPA 2021b). The O_3 design value based on observations at the Essex air monitor in Baltimore County was 73.0 ppb for the 2015–2017 and 2016–2018 time periods, 72.0 ppb for the 2017–2019 time period, and 69.0 ppb for the 2018–2020 time period (EPA 2021b). In Baltimore County, NO_X emissions are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Vegetation, solvent use, and on-road vehicles are the main sources of VOC emissions (EPA 2020a). The EPA has also classified Baltimore County as being in nonattainment for the 2010 SO_2 standard, although the SO_2 air quality monitor in Baltimore County has reported a steady decline in SO_2 concentration levels since 2016 (EPA 2021b). Baltimore County reported an SO_2 design value of 13.0 ppb for the 2015–2017 time period, 11.0 ppb for the 2016–2018 time period, 10.0 ppb for the 2017–2019 time period, and 9.0 ppb for the 2018–2020 time period (EPA 2021b). The main source of SO_2 emissions in Baltimore County comes from fuel combustion for electric generation (EPA 2020a).

The Ozone Transport Region (OTR) was established by operation of law under CAA Section 184 and comprises the states of Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; the District of Columbia; and the portion of Virginia that is within the Consolidated Metropolitan Statistical Areas that includes the District of Columbia. Congress established the OTR in the 1990 CAA amendments based on the recognition that the transport of ozone and ozone precursors throughout the region may render the states' attainment strategies interdependent. States within the OTR may have similar permitting requirements as ozone nonattainment areas.

Table 3.4-2 presents the total emission inventory in tons per year (tpy) for select regulated pollutants (i.e., CO, NOX, PM_{10}, $PM_{2.5}$, SO2, and VOC) in nonattainment counties in 2017.

Table 3.4-2. Nonattainment Counties, 2017 Emission Inventory for Regulated Pollutant (tpy)

County, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
New London County, Connecticut	25,671.25	5,300.74	2,882.84	1,072.31	289.57	15,606.98
Dukes County, Massachusetts	6,395.82	989.64	407.96	135.99	13.07	2,740.63
Baltimore County, Maryland	71,702.20	10,661.44	12,184.54	3,207.24	1,041.34	16,919.12
Gloucester County, New Jersey	30,399.73	6,260.63	2,161.41	1,311.48	599.94	10,507.34
Kings County, New York	59,473.56	13,571.74	4,959.06	2,559.52	477.53	17,660.21
Suffolk County, New York	146,719.86	20,336.81	9,682.55	3,889.70	1,197.73	32,676.35

Source: EPA (2020a)

The CAA provides special air quality protection to national parks larger than 6,000 acres and national wilderness areas larger than 5,000 acres that were in existence before August 1977 (National Park Service 2020). These areas are referred to as Class I areas and are managed by the U.S. Forest Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS). Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels. One of the purposes of the Prevention of Significant Deterioration permitting program under the CAA, is to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value. Air quality related values (AQRVs) are used to determine whether these resources may be adversely affected by a change in air quality. Federal land managers AQRVs include visibility, vegetation, water quality, soils, and impacts to fish and wildlife. The potential harm from air pollution to these resources depends on quantity of emission, the type of air emission exposure, and the sensitivity of the resources. Current visibility conditions and trends in Class I areas are established via the IMPROVE (Interagency Monitoring of Protected Visual Environments) program. The nearest Class I areas to the Proposed Action are Lye Brook Wilderness, located approximately 155 miles northwest of the Lease Area, and Brigantine Wilderness, located approximately 190 miles southwest of the Lease Area. The Lye Brook Wilderness IMPROVE monitor is located on the ski slopes of Mount Snow approximately 9.5 miles southeast of the Lye Brook Wilderness Area boundary. The Brigantine Wilderness is made up of three separate areas; all three are part of the Edwin B. Forsythe National Wildlife Refuge. The Brigantine Wilderness IMPROVE monitor is located at the Edwin B. Forsythe National Wildlife Refuge Visitor Center, approximately 4 miles west and 4 miles south-southwest of the two closest Brigantine Wilderness Area boundaries. Visibility at both the Lye Brook Wilderness and Brigantine Wilderness Class I areas has been steadily improving since 2010 (Federal Land Manager Environmental Database 2021). No visibility or deposition modeling was conducted as part of this EIS analysis because both Lye Brook Wilderness and Brigantine Wilderness Class I areas are located more than 155 miles away from the Lease Area. If further visibility modeling is required, it will be conducted during the OCS permitting process.

Climate Change: Climate change is a global issue that results from the increase in greenhouse gases (GHGs) in the atmosphere. An analysis of regional climate impacts prepared by the Fourth National

Climate Assessment (U.S. Global Change Research Program 2018) concludes that the rate of warming in the Northeast has markedly accelerated over the past few decades, with seasonal differences in temperature decreasing in recent years as winters have warmed three times faster than summers. Higher temperatures from the increase of GHGs in the atmosphere increase the number of heat events and extreme rain events that cause coastal flooding. The higher temperatures also extend the duration of the pollen season. Analysis of past records and future projections indicates an overall increase in regional temperatures, including near the Lease Area. The most recently available data on GHG emissions in the United States indicate that annual GHG emissions in 2019 were an estimated 6,558 million metric tons of carbon dioxide equivalents (CO2e) (EPA 2021c).

3.4.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential air quality impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Air emissions and climate change: Under the No Action Alternative, assuming no other future offshore wind projects are developed, electric generation needs would continue to be met by fossil fuel–generating technologies, resulting in more air emissions than what would be expected should future offshore wind development occur. Specific impacts would depend on the type of fossil fuel used (natural gas, oil, coal), the technology and pollution control systems chosen, and the site-specific issues associated with individual electric generation facilities. However, the continued use of existing fossil fuel–combusting electric generation sources would result in annual emissions that could have been avoided by using non–fossil fuel energy sources. These emissions, presented in Table 3.4-3, were estimated using the EPA's Avoided Emissions and geneRation Tool (AVERT) version 3.1.1 for the New England region based on the design capacity of the offshore wind projects that would not be developed.

Table 3.4-3. Estimated Annual Avoided Emissions (tpy) for the Operation of Future Offshore Wind Projects within the Geographic Analysis Area

Limit	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Lower limit	23,850,536.17	3,913.91	1,656.71	683.25	444.27	616.16
Upper limit	33,414,814.35	5,480.48	2,313.53	956.94	622.17	862.57

Source: BOEM (2021); EPA (2020b)

Notes: Avoided emissions are presented in tons per year and were obtained using the EPA's AVERT (EPA 2020b). AVERT limits the maximum input generation capacity for the New York region to 1,300 MW, which, according to AVERT, is to limit any project from displacing more than approximately 30% of regional fossil generation in any hour. For each of the offshore wind projects within the GAA with a generation capacity greater than 1,300 MW, the avoided emissions were calculated via AVERT based on a 1,300-MW energy generation capacity. AVERT avoided emission values were then scaled up to represent the full energy generation capacity for offshore wind projects with a generation capacity greater than 1,300 MW. For example, an offshore wind project generating 2,600 MW would have twice the avoided emissions values calculated by AVERT for a 1,300-MW offshore wind project.

The lower limit represents the sum of the avoided emissions, as calculated by AVERT, for all of the various offshore wind projects within the GAA limited to a maximum energy generation capacity of 1,300 MW per project. The upper limit represents the sum of the avoided emissions for the same offshore wind projects based on their actual energy generation capacity, scaling up the avoided emission values for the projects with an energy generation capacity greater than 1,300 MW.

Assuming the development of other future wind development and other renewable energy sources, these sources would decrease emissions over the long term, likely reduce the need for traditional fossil fuel power generation in the region, and could result in improved air quality when compared to expected air quality without other future wind development and renewable energy sources. Adjacent states have also proposed emission-reduction targets and renewable goals that overlap the operations of the Project and that are aimed at reducing air emissions and shifting energy sources from traditional fossil fuel generation to cleaner sources of energy. These plans could further reduce, but would not eliminate, air emissions.

During construction, impacts from future wind development activities on air quality under the No Action Alternative would be temporary **minor** to **moderate** adverse, depending on the extent and duration of emissions. Primary emission sources would include increased vessel and air traffic, combustion emissions from construction equipment, and fugitive emissions.

Based on assumed construction schedules, offshore wind development would occur with overlapping construction schedules between 2022 to 2030. As shown in Table 3.4-4, construction of these projects in the GAA with sufficient details to estimate emissions would generate an estimated 25,208 tons of NO_X, 176 tons of SO_2, 781 tons of PM_{10}, and 1,904,101 tons of CO_2 over the 8-year construction period. For comparison purposes, according to the EPA's 2017 National Emissions Inventory, Suffolk County reported 8,122 tons of NO_X, 124 tons of SO_2, and 872 tons of PM_{10} from highway vehicles; 6,566 tons of NO_X, 34 tons of SO_2, and 537 tons of PM_{10} from off-highway vehicles; and 860 tons of NO_X, 421 tons of SO_2, and 146 tons of PM_{10} from electrical utilities' combustion of fuel (EPA 2020a). Similarly, future offshore wind project GHG emissions during construction would be negligible (1,904,101 tons of CO_2) as compared to aggregate global emissions, and these projects could beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term. An analysis by Barthelmie and Pryor (2021) calculated that, depending on global trends in GHG emissions and the amount of wind energy expansion, development of wind energy could reduce predicted increases in global surface temperature by 0.3-0.8 degrees Celsius (°C) (0.5–1.4 degrees Fahrenheit [°F]) by 2100.

As shown in Table 3.4-5, the O&M of future offshore wind projects in the GAA would have a proportionally small contribution of long-term and intermittent emissions, including 1,212 tons of NO_X, 4 tons of SO_2, 33 tons of PM_{10}, and 111,535 tons of CO_2.

3.4.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on air quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on air quality, primarily through construction-related air emissions.

BOEM anticipates that the impacts of ongoing activities, such as air emissions and GHGs, would be moderate adverse. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind could also contribute to impacts on air quality. Reasonably foreseeable activities, other than offshore wind, that will increase air emissions and GHGs include construction and operation of new energy generation facilities to meet future power demands as transportation and heating become increasingly electrified. Although states are developing onshore renewable energy facilities (through their state energy plans) to the extent practicable to help meet future demand, these state plans also depend on the development of offshore wind. Therefore, under the No Action Alternative, to the extent that offshore

wind is not developed, there would be a shortfall from planned renewable power generation, and nonrenewable sources would likely be needed to meet future demand. These facilities could include new natural gas–fired power plants or coal-fired, oil-fired, or clean coal–fired plants. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **moderate** adverse. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** adverse impacts on air quality, primarily driven by recent market and permitting trends indicating future electric generating units would most likely include natural gas–fired and oil-fired dual fuel facilities, a mix of natural gas, and dual fuel natural gas/oil.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate** adverse. Emissions generated from construction and decommissioning of the offshore wind projects would be the primary source of impacts to air quality. Other future offshore wind projects could also lead to reduced emissions from fossil fuel–combusting power generation facilities, resulting in **minor** to **moderate** beneficial impacts on air quality.

Table 3.4-4. Projected Construction Emissions (tons) for Carbon Dioxide and Regulated Pollutant for Projects in the Geographic Analysis Area from 2022 to 2030

Project	CO_2	NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$	VOC
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	30,628	238	3	99	4	4	6
Sunrise, OCS-A 0487	637,986	5,876	6	2,441	108	108	138
South Fork, OCS-A 0517	97,026	1,451	33	284	49	47	59
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	85,811	1,256	7	292	50	49	27
Remaining Massachusetts/Rhode Island Lease Area	1,052,650	16,388	127	3,686	569	547	401
Total	**1,904,101**	**25,208**	**176**	**6,802**	**781**	**755**	**630**

Source: BOEM (2021)

Table 3.4-5. Projected Operations and Maintenance Emissions (tons) for Carbon Dioxide and Regulated Pollutant for Projects in the Geographic Analysis Area from 2022 to 2030

Project	CO_2	NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$	VOC
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	2,665	31	0.1	8	1	1	1
Sunrise, OCS-A 0487	64,145	590	1	246	11	11	14
South Fork, OCS-A 0517	18,894	281	2	58	10	10	6
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	7,705	76	0.2	19	3	2	1
Remaining Massachusetts/Rhode Island Lease Area	18,126	234	1	60	8	8	7
Total	**111,535**	**1,212**	**4**	**390**	**33**	**32**	**29**

Source: BOEM (2021)

3.4.2 Environmental Consequences

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

The Project design parameters that would influence the magnitude of impacts on air quality are listed in Table 3.4-6.

Table 3.4-6. Project Design Parameters

Design Parameter
Air emission ratings of construction equipment engines
Port selection and location of construction laydown areas
Choice of cable-laying locations and pathways
Choice of marine traffic routes to and from the Lease Area
Number of offshore substations
Soil characteristics at excavation sites
Emission control strategy for fugitive emissions due to excavation and hauling operations

Variability of the Project design as a result of the PDE includes the number of WTGs and their spacing within the Lease Area, spatial coverage of the overall Lease Area, and the construction schedule. A reduction (or increase) in the number of WTGs installed and their associated IACs would likely have an associated reduction (or increase) in associated vessel and equipment use and their generated air emissions. Additionally, variations in the planned cable layout and landfall locations would impact the magnitude and spatial extent of emissions. Appendix D provides additional information about the PDE.

See Appendix E1 for a summary of IPFs analyzed for air quality across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible effect are excluded from Chapter 3 and provided in Table E1-1 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

Table 3.4-7 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action follows the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The conclusion section for each alternative analysis provides additional rationale for this impact determination. The overall impact of any alternative would be **moderate** adverse because the overall effects would be notable, but the resource would recover completely from adverse impacts without mitigation or remedial action.

Table 3.4-7. Alternative Comparison Summary for Air Quality

Impact-Producing Factor	Alternative A (No Action Alternative)	Alternative B (Proposed Action) Up to 100 WTGs*	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Air emissions and climate change	**Offshore:** During construction, impacts from future wind development activities on air quality would be temporary and **minor** to **moderate** adverse, depending on the extent and duration of emissions. Primary emission sources would include increased vessel and air traffic, combustion emissions from construction equipment, and fugitive emissions. Future offshore wind projects could also beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term.	**Offshore:** Project construction would have a limited duration, and most emissions would occur offshore. The only air emissions anticipated during O&M would result from crew and maintenance vessels and helicopters. Therefore, impacts on air quality near populated areas would be temporary **minor** adverse. Project O&M would also generate long-term **minor** beneficial impacts by providing energy to the region from a renewable resource and due to avoided health events. The overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would be **moderate** adverse, although regional air quality could be improved over the Project lifecycle when compared to the No Action Alternative.	**Offshore:** When compared to the maximum case for the Proposed Action, construction under Alternatives C through F could result in a decrease in Project-related emissions due to less trenching and/or vessel traffic to install a reduced number of WTGs and their associated IACs. In such cases, emissions from construction and installation would be less than the Proposed Action but still temporary **minor** adverse. Alternatives C through F could also result in reduced O&M emissions because fewer WTGs installed, when compared to the maximum case under the Proposed Action, would mean potentially reduced inspection time, fewer turbines needing regular maintenance, etc. Alternatives C through F would avoid similar amounts of emissions as the minimum and maximum avoided emission values for the Proposed Action presented in Table 3.4-12. During O&M, Alternatives C through F would also result in long-term minor beneficial impacts on regional air quality by substituting some existing fossil fuel sources with a renewable source, which would contribute to a long-term net decrease in emissions in the region. Therefore, overall impacts on air quality under Alternatives C through F would likely be **minor** adverse and long term **minor** beneficial. Alternatives C through F would result in impacts on air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Although regional air quality could be improved when compared to the No Action Alternative, it would be too remote or speculative to conclude what that change would be. Given the marginal reduction, however, the cumulative impacts of Alternatives C through F on air quality when combined with past, present, and reasonably foreseeable activities would remain **moderate** adverse.			
	Onshore: Ongoing activities and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts on air quality, primarily driven by recent market and permitting trends indicating future electric generating units would most likely include natural gas–fired and oil-fired dual fuel facilities, a mix of natural gas, and dual fuel natural gas/oil.	**Onshore:** Air emissions generated by construction and O&M of the onshore facilities could have temporary **negligible** to **minor** adverse impacts on air quality. When combined with other onshore sources of air emissions, cumulative impacts on air quality from onshore Project activities would be long term **minor** adverse.	**Onshore:** Alternatives C through F would not impact onshore activities; therefore, construction and O&M impacts would be the same as those described for the Proposed Action: temporary, **negligible** to **minor** adverse. Cumulative impacts would also be the same as those described for the Proposed Action: long term **minor** adverse.			

* If the Proposed Action were to select an 11–12 MW turbine, then the total number of WTGs installed and impacts from associated air emissions would be similar or the same as those under Alternatives C through F.

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3.4.2.2 Alternative B: Impacts of the Proposed Action on Air Quality

In their *Air Emissions Calculations and Methodology* technical report, Tech Environmental (2021) conservatively assumed that construction of the Project would only take 1 year. For estimating potential transit emissions, 11 regional ports that could be used during construction and O&M were considered (Table 3.4-8).

Table 3.4-8. Regional Ports Considered

Port Name	Location
Port of Providence	Providence County, Rhode Island
Port of Davisville at Quonset Point	Washington County, Rhode Island
Port of Galilee	Washington County, Rhode Island
Port of Montauk	Suffolk County, New York
Port Jefferson	Suffolk County, New York
Port of Brooklyn	Kings County, New York
Port of New London	New London County, Connecticut
Paulsboro Marine Terminal	Gloucester County, New Jersey
New Bedford Marine Commerce Terminal	Bristol County, Massachusetts
Port of Norfolk	Norfolk City, Virginia
Sparrow's Point	Baltimore County, Maryland

All ports except New York's Port of Montauk, Port Jefferson, and Port of Brooklyn were used for estimating construction emissions. The three ports in New York and the Ports of Davisville at Quonset Point and Galilee in Rhode Island were used for estimating O&M emissions.

It was conservatively assumed that when there were multiple port options for a particular Project phase involving regular transit, the port used for the emission calculations was the one with the longest transit distance. In the cases where multiple ports were listed as potential ports for vessel activities, the emissions were conservatively allocated to all potential ports. This approach provides a very conservative estimate of potential emissions for each state.

O_3 emissions are not included in the air quality impact analyses presented herein. O_3 emissions cannot be easily quantified since O_3 formation is a byproduct of chemical reactions between VOC and NO_X caused by heat and sunlight and thus emissions of O_3 depend on local weather conditions.

3.4.2.2.1 Construction and Installation

Offshore Activities and Facilities

Air emissions and climate change: Table 3.4-9 presents a summary of the Project's estimated offshore construction emissions emitted during a maximum-case scenario in which all construction activities would occur in a single year. Construction emissions occurring within 15.5 miles of on-land construction areas and port locations are compared to the emission inventories of the impacted counties.

Over the approximate 1-year construction period, Project air emissions from vessels, helicopters, generators, and fuel-burning equipment could have temporary, direct impacts on air quality. Estimated emissions for most pollutants occurring within 15.5 miles of on-land construction areas and port locations would represent a 16.0% or less temporary increase in air pollutants for counties within the GAA. NO_X construction emissions are more substantial in comparison to the counties' NO_X emissions (in the range of 2%–45%). However, these emissions would be temporary and could be reduced by implementing proposed EPMs (see Table F-1 in Appendix F). Furthermore, this is a conservative analysis of the impact of the construction emissions occurring within 15.5 miles of on-land construction areas and port locations because it assumes all of the emissions would directly affect the nearest county's air. Emissions occurring outside the OCS permit area within 15.5 miles of on-land construction areas and port locations would primarily result from transit vessels used to transport equipment and material. Vessel engines are required to meet certain emission standards and must use low-sulfur diesel fuel. Realistically, vessel transit emissions would be spread out over the transport route. Depending on wind conditions at the time of emissions, it is likely that not all emissions generated miles offshore would reach land. Therefore, Project construction activities would have a temporary **minor** adverse impact on New London, Gloucester, Baltimore, Providence, Washington, Bristol, and Norfolk City Counties' air quality.

Construction emissions occurring offshore in the OCS permit area are not compared to county emission inventories because only a portion of the generated construction emissions would actually reach nearby counties and would depend on wind conditions at the time the emissions are generated. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. If the Project cannot demonstrate compliance, the permit would not be issued, and the Project would not proceed.

The emission totals presented in the analysis represent a worst-case construction scenario in which all construction activities would occur in a single year. Project construction would also have a limited duration, and most emissions would occur offshore. The emissions quantified in Table 3.4-9 would not be emitted entirely at a single point or port and would not continuously affect nearby populated areas. Therefore, impacts on air quality near populated areas would be temporary **minor** adverse.

Table 3.4-9. Summary of Geographic Analysis Area Offshore Construction Emissions (tpy)

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Construction Emissions within 15.5 Miles of Potential Project On-Land Construction Areas and Port Locations							
RWF-Connecticut	22.3	101.6	3.4	3.3	0.1	3.6	14,980
Percentage of New London County, Connecticut, emission inventory	0.09%	1.92%	0.12%	0.31%	0.03%	0.02%	0.76%
RWF-New Jersey	674.8	2,796.2	94.5	91.2	8.4	49.5	190,927
Percentage of Gloucester County, New Jersey, emission inventory	2.22%	44.66%	4.37%	6.95%	1.40%	0.47%	2.91%
RWF-Maryland	533.4	2,210.3	74.7	72.1	6.6	39.1	150,923
Percentage of Baltimore County, Maryland, emission inventory	0.74%	20.73%	0.61%	2.25%	0.63%	0.23%	3.03%
RWF-Rhode Island	169.5	711.7	24.1	23.3	2.2	14.8	56,604
RWEC-Rhode Island	19.0	78.2	2.6	2.5	0.3	1.4	5,216
Total Rhode Island	**188.5**	**789.9**	**26.7**	**25.8**	**2.5**	**16.2**	**61,820**
Percentage of Providence County, Rhode Island, emission inventory	0.40%	10.12%	0.59%	1.33%	0.53%	0.10%	1.22%
Percentage of Washington County, Rhode Island, emission inventory	1.30%	30.71%	2.28%	4.34%	2.40%	0.22%	9.63%
RWF-Massachusetts	175.4	734.6	24.9	24.0	2.1	14.9	58,274
Percentage of Bristol County, Massachusetts, emission inventory	0.35%	8.26%	0.69%	1.28%	0.24%	0.09%	1.35%
RWF-Virginia	613.5	2,551.6	86.2	83.2	7.5	47.0	182,269
Percentage of Norfolk City, Virginia, emission inventory	2.47%	41.85%	5.72%	12.09%	3.24%	0.80%	16.32%
RWF-maximum potential federal water	2,105.5	8,745.7	293.9	283.9	25.1	153.0	595,830

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Outer Continental Shelf Permit Area Construction Emissions							
RWF	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total OCS Permit Area Construction Emissions	**1,007.6**	**4,124.1**	**134.5**	**130.0**	**13.2**	**85.4**	**282,268**

Source: Tech Environmental (2021)

Notes:

RWF-Connecticut = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of New London.

RWF-New Jersey = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Paulsboro Marine Terminal.

RWF-Rhode Island = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWEC-Rhode Island = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Maryland = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from Sparrow's Point.

RWF-Massachusetts = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the New Bedford Marine Commerce Terminal and during transit to and from European ports.

RWF-Virginia = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Norfolk and during transit to Sparrow's Point.

RWEC-OCS = the portion of RWEC offshore segment construction emissions that would occur within the OCS permit area.

Onshore Activities and Facilities

Air emissions and climate change: Table 3.4-10 presents the estimated onshore construction emissions for the Project. The onshore facilities, inclusive of the landfall work area, onshore transmission cable, OnSS, and ICF (including associated interconnection circuits and Project easement), would be constructed in Davisville, Washington County, Rhode Island, which is in attainment for all pollutants.

Table 3.4-10. Summary of Emissions from Onshore Facilities Construction (tpy)

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
OnSS and ICF	367.5	382.0	14.6	13.8	1.3	26.8	164,525
Onshore transmission cable	8.9	37.2	1.8	1.8	0.1	2.4	7,342
Horizontal directional drilling in the landfall work area	4.3	14.3	0.7	0.7	0.0	1.0	3,271
Total	**380.7**	**433.5**	**17.1**	**16.3**	**1.4**	**30.2**	**175,138**
Percentage of Kent County, Rhode Island, emission inventory	2.31%	20.26%	1.72%	2.94%	1.18%	0.53%	21.38%
Percentage of Providence County, Rhode Island, emission inventory	0.82%	5.55%	0.38%	0.84%	0.29%	0.18%	3.44%
Percentage of Washington County, Rhode Island, emission inventory	2.62%	16.85%	1.46%	2.74%	1.34%	0.40%	27.28%

Source: Tech Environmental (2021)

Construction of the onshore facilities is estimated to take 18 months, but the air technical report analysis conducted by Tech Environmental (2021) presumes that construction could occur as quickly as 1 year. Construction of the onshore facilities would involve emissions from on-road and non-road equipment, which could have temporary, direct impacts on air quality. The Port of Davisville at Quonset Point would be used for construction support activities. The estimated onshore facilities construction emissions for regulated pollutants were compared to county emission inventories for the counties within 15.5 miles of the Port of Davisville at Quonset Point (the GAA). The Proposed Action onshore facility construction NO_X emissions would be approximately 5.5% of Providence County, Rhode Island's annual NO_X emissions, 16.9% of Washington County, Rhode Island's annual NO_X emissions, and 20.3% of Kent County, Rhode Island's annual NO_X emissions. Most emissions of regulated pollutants were between 0.29% and 2.94% of Kent, Providence, or Washington Counties' annual emissions. Air emissions generated by constructing the onshore facilities could have temporary **minor** adverse impacts on air quality.

3.4.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Air emissions and climate change: Emissions from the Project O&M would be much lower than those produced during construction because there would be no direct emissions associated with wind turbine operation. The only air emissions anticipated during O&M would result from crew and maintenance

vessels and helicopters. Planned maintenance activities include annual turbine service and safety surveys, annual oil and lubricant changes, annual inspections of turbines and foundations, seafloor and submarine surveys, biannual electrical inspections, regular electrical component servicing, annual scheduled maintenance, and all major and minor corrective maintenance. Table 3.4-11 summarizes the Project O&M emissions estimated for the air quality GAA. Project O&M emissions occurring within 15.5 miles of on-land construction areas and port locations are compared to the emission inventories of the impacted counties. These O&M emissions occurring within 15.5 miles of on-land construction areas and port locations would increase the annual emissions of each pollutant by 1.5% or less for all counties within the GAA.

Project O&M emissions occurring offshore in the OCS permit area are not compared to county emission inventories because only a portion of these emissions would actually reach nearby counties, depending on wind conditions at the time of emission. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS. Therefore, Project O&M activities would have a **minor** adverse impact on the air quality in the counties in the GAA.

Project O&M would also generate long-term **minor** beneficial impacts by providing energy to the region from a renewable resource. Currently, the region in which this wind farm would serve obtains between 40% and 51% of its power through the combustion of natural gas (U.S. Energy Information Administration 2021). By replacing a portion of the air pollutant emissions generated by fossil fuel–fired power plants, significant reductions in air pollutants emissions can be achieved. A recent study of current wind projects found that there is a net reduction in emissions within 6 months of the commencement of operations (Inderscience Publishers 2014). Furthermore, as transportation and heating become increasingly electrified, the demand for electrical power will grow. Without offshore wind, states would not be able to meet their emission targets and meet this increasing demand.

Table 3.4-11. Summary of Offshore Operations and Maintenance Emissions (tpy)

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Operations and Maintenance Emissions within 15.5 Miles of Potential Project On-Land Areas and Port Locations							
RWF-New York	51.2	205.3	6.9	6.7	0.1	3.0	14,506
Percentage of Kings County, New York, emission inventory	0.09%	1.51%	0.14%	0.26%	0.02%	0.02%	0.28%
Percentage of Suffolk County, New York, emission inventory	0.03%	1.01%	0.07%	0.17%	0.01%	0.01%	0.14%
RWF-Rhode Island	3.3	13.0	0.4	0.4	0.0	0.3	1,001
Percentage of Washington County, Rhode Island, emission inventory	0.02%	0.51%	0.03%	0.07%	0.00%	0.00%	0.16%
Outer Continental Shelf Permit Area Emissions							
RWF	207.6	847.7	27.4	26.6	0.6	12.4	57,820

Source: Tech Environmental (2021)

Notes:

RWF-New York = the portion of RWF O&M emissions that would occur outside the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Montauk, Port Jefferson, and the Port of Brooklyn.

RWF-Rhode Island = the portion of RWF O&M emissions that would occur beyond the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

In the case of decommissioning, emissions would result largely from the operation of decommissioning equipment and vessels or aircraft. Associated air emissions would occur 35 years in the future when air quality conditions, emissions technology, and regulations would be different; therefore, estimating decommissioning emission impacts now is speculative. Because portions of the Project would be decommissioned in place, fewer decommissioning activities and less equipment would be required; therefore emissions from decommissioning activities would be less than those from construction activities. The decommissioning activities would be subject to a future OCS air permit, or similar, application. There would be no further air emissions from RWF once decommissioning is complete.

The use of wind to generate electricity reduces the need for electricity generation from new traditional fossil fuel–powered plants in New England that produce GHG emissions. BOEM obtained avoided emissions from EPA's AVERT Excel Edition, Version 3.1.1 for the New England region based on EPA's 2019 regional data file. Regional data for 2020 is available, but due to the temporary declines in electricity demands, particularly from March through May 2020 likely caused by the pandemic, the EPA recommends using the 2019 regional data file when assessing annual, near-term future avoided emissions. The EPA's AVERT is not a long-term projection tool. It is not intended to analyze avoided emissions more than 5 years from baseline. The estimated annual and 5-year long-term total avoided emissions are based on minimum and maximum design capacity of the Project (704 MW and 880 MW, respectively). To provide a rough estimate of the long-term avoided emissions of the Project, the maximum and minimum annual avoided emissions estimated by AVERT were multiplied by 5 years. As presented in Table 3.4-12, the Project would annually displace CO_2, NO_X, SO_2, $PM_{2.5}$, VOC, and ammonia (NH_3) produced by the New York electric grid and decrease the creation of air pollutant emissions in the atmosphere from traditional fossil fuel–fired power plants.

Table 3.4-12. Estimated Annual and 5-Year Avoided Emissions for the Operation of the Revolution Wind Farm (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	1,771,440	292.01	126.06	50.89	33.07	45.98
Minimum annual avoided emissions	1,415,690	234.75	102.57	40.78	26.43	36.77
Maximum 5-year avoided emissions	8,857,200	1,460.03	630.28	254.43	165.35	229.88
Minimum 5-year avoided emissions	7,078,450	1,173.75	512.83	203.88	132.13	183.85

Source: EPA (2020b)

The EPA's CO-Benefits Risk Assessment (COBRA) screening model Desktop Edition, Version 4.1 was used to estimate the health impacts of avoided emissions in the United States and in the combined area of Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. The model used the following inputs: 2023 was selected as the analysis year to estimate the health impacts of emissions changes. New York was selected as the state where the emission changes would occur; Fuel Combustion: Electric Utility was the sector where the emission changes would occur; and the AVERT output file for the minimum annual avoided emissions for NO_X, SO_2, $PM_{2.5}$, VOC, and NH_3, as noted in

Table 3.4-12 was loaded into the COBRA application. The model provides estimated ranges of reduced occurrences of health events caused by air pollution, such as mortality, nonfatal heart attacks, and hospitalizations. It also estimates the total health benefit, which encompasses all saved costs of the avoided health events. COBRA includes a discount rate of either 3%, to account for the interest that may be earned from government backed securities, or 7%, to account for private capital opportunity costs. Monetary values presented are in 2017 dollars. The EPA recommends using both for a bounding approach. For the entire United States, COBRA estimates that the total health benefit ranges from $12,096,077 to $27,290,022 at a 3% discount rate and from $10,793,564 to $24,334,469 at a 7% discount rate. COBRA estimates statistical lives saved within the entire United States to range from 1.09 to 2.46 (EPA 2020c). For Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia, combined, COBRA estimates that the total health benefit ranges from $9,891,082 to $22,309,940 at a 3% discount rate and from $8,826,280 to $19,893,704 at a 7% discount rate. COBRA estimates statistical lives saved within Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia, combined, to range from 0.89 to 2.01 (EPA 2020c). For a 5-year estimate for the United States, the total health benefit ranges from $60,480,383 to $136,450,108 at a 3% discount rate and from $53,967,819 to $121,672,344 at a 7% discount rate. Over the course of 5 years, the statistical lives saved within the entire United States is between 5.44 and 12.31. This 5-year estimate is representative of the avoided emissions during operations only. This would represent a long-term **minor** beneficial impact due to avoided health events.

Onshore Activities and Facilities

Air emissions and climate change: Onshore O&M activities would include periodic inspections, preventative maintenance, and regular equipment servicing. Table 3.4-13 presents the estimated onshore facilities O&M emissions for the Project. Annual O&M emissions from onshore facilities range from < 0.01% to 0.01% of Kent, Providence, and Washington Counties' annual emissions. Impacts on air quality from Project onshore facilities' O&M emissions would be **negligible** adverse.

Table 3.4-13. Summary of Emissions from Onshore Facilities Operations and Maintenance (tpy)

Source, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Onshore facilities, Rhode Island	0.6	0.2	0.0	0.0	0.0	0.0	22
Total	**0.6**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**22**
Percentage of Kent County, Rhode Island, emission inventory	< 0.01%	0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%
Percentage of Providence County, Rhode Island, emission inventory	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%
Percentage of Washington County, Rhode Island, emission inventory	< 0.01%	0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%	< 0.01%

Source: Tech Environmental (2021)

Decommissioning activities associated with the onshore facilities would not likely impact air quality in the region. Associated air emissions would occur 35 years in the future when air quality conditions,

emissions technology, and regulations would be different; therefore, estimating decommissioning emission impacts now is speculative. Because portions of the Project would be decommissioned in place, fewer decommissioning activities and less equipment would be required; therefore emissions, from decommissioning activities would be less than those from construction activities. There would be no further air emissions from RWF once decommissioning is complete.

3.4.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Air emissions and climate change: Construction and installation, O&M, and decommissioning emissions associated with the Proposed Action would result in temporary moderate adverse, long-term minor adverse, and long-term minor beneficial impacts on air quality. The Proposed Action's construction emissions (see Tables 3.4-9 and 3.4-10) would noticeably increase emissions of regulated pollutants over the construction emissions generated by other offshore wind projects associated with the No Action Alternative (see Table 3.4-4). Therefore, total cumulative construction-related air emissions from all planned offshore wind energy projects, including the Proposed Action, in the OCS air permit area would consist of an estimated 29,333 tons of NO_X, 189 tons of SO_2, 915 tons of PM_{10}, and 2,186,369 tons of CO_2. However, these effects would be localized and would cease when Project construction is complete.

Table 3.4-14 combines the total estimated construction emissions contributed by the Proposed Action within the OCS air permit area with the estimated local construction emissions that occur beyond the OCS air permit area and within 15.5 miles of shore (RWF-New Jersey, RWF-Massachusetts, RWEC-Rhode Island, etc.). The totals are not compared to county emission inventories because only portions of the Proposed Action construction emissions generated offshore within the OCS air permit area would reach nearby counties, depending on wind conditions at the time of emission. The OCS air permitting process will require air dispersion modeling of these emissions to demonstrate compliance with the NAAQS.

Table 3.4-14. Geographic Analysis Area Offshore Cumulative Construction Emissions (tpy)

Source, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Connecticut							
RWF-Connecticut	22.3	101.6	3.4	3.3	0.1	3.6	14,980
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total Connecticut Emissions	**1,029.9**	**4,225.7**	**137.9**	**133.3**	**13.3**	**89.0**	**297,248**
New Jersey							
RWF-New Jersey	674.8	2,796.2	94.5	91.2	8.4	49.5	190,927
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total New Jersey Emissions	**1,682.4**	**6,920.3**	**229.0**	**221.2**	**21.6**	**134.9**	**473,195**
Maryland							
RWF-Maryland	533.4	2,210.3	74.7	72.1	6.6	39.1	150,923
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total Maryland Emissions	**1,541.0**	**6,334.4**	**209.2**	**202.1**	**19.8**	**124.5**	**433,191**
Rhode Island							
RWF-Rhode Island	169.5	711.7	24.1	23.3	2.2	14.8	56,604
RWEC-Rhode Island	19.0	78.2	2.6	2.5	0.3	1.4	5,216
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total Rhode Island Emissions	**1,196.1**	**4,914.0**	**161.2**	**155.8**	**15.7**	**101.6**	**344,088**

Source, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
Massachusetts							
RWF-Massachusetts	175.4	734.6	24.9	24.0	2.1	14.9	58,274
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total Massachusetts Emissions	**1,183.0**	**4,858.7**	**159.4**	**154.0**	**15.3**	**100.3**	**340,542**
Virginia							
RWF-Virginia	613.5	2,551.6	86.2	83.2	7.5	47.0	182,269
RWF-OCS	941.9	3,854.1	125.5	121.3	12.3	80.6	264,307
RWEC-OCS	65.7	270.0	9.0	8.7	0.9	4.8	17,961
Total Virginia Emissions	**1,621.1**	**6,675.7**	**220.7**	**213.2**	**20.7**	**132.4**	**464,537**

Source: Tech Environmental (2021)

Notes:

RWF-Connecticut = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of New London.

RWF-New Jersey = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Paulsboro Marine Terminal.

RWF-Rhode Island = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWEC-Rhode Island = the portion of RWEC offshore segment construction emissions that would occur outside the OCS permit area and within 15.5 miles of shore.

RWF-Maryland = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from Sparrow's Point.

RWF-Massachusetts = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the New Bedford Marine Commerce Terminal and during transit to and from European ports.

RWF-Virginia = the portion of RWF construction emissions that would occur beyond the OCS permit area and within 15.5 miles of shore during transit to and from the Port of Norfolk and during transit to Sparrow's Point.

RWEC-OCS = the portion of RWEC offshore segment construction emissions that would occur within the OCS permit area.

RWF-OCS = the portion of RWF construction emissions that occur within the OCS permit area.

Air quality impacts from O&M of the Proposed Action, provided in Tables 3.4-11 and 3.4-13, would combine with the air quality impacts from all other O&M activities that could occur under the No Action Alternative (see Table 3.4-7), albeit at lower emission quantities compared to the construction and installation period. O&M emissions would noticeably add emissions in localized areas, several times per year, for the life of the Project. Total cumulative operation-related air emissions from all of the planned wind projects, including the Proposed Action, in the OCS air permit area would consist of an estimated 2,060 tons of NO_X, 5 tons of SO_2, 60 tons of PM_{10}, and 168,623 tons of CO_2.

If annual O&M emissions emitted by the Proposed Action within the OCS air permit area are combined with the estimated annual O&M emissions emitted by the Proposed Action within 15.5 miles of the on-land areas and port locations in New York (RWF – New York), and if this summed, conservative total is compared to the 2017 National Emission Inventory for Kings and Suffolk Counties, New York, Kings County would see a 0.2% to 7.8% increase (depending on the pollutant) in its regulated pollutant annual emissions, whereas Suffolk County would see a 0.06% to 5.2% increase in its regulated pollutant annual emissions. Similarly, if the total annual O&M emissions emitted by the Proposed Action within the OCS air permit area are combined with the estimated annual O&M emissions emitted by the Proposed Action within 15.5 miles of the on-land areas and port locations in Rhode Island (RWF – Rhode Island), and if this summed, conservative total is compared to Washington County, Rhode Island's 2017 National Emission Inventory, there would be a 0.6% to 33.5% increase in its regulated pollutant annual emissions. These are very conservative estimated increases because not all of the annual O&M emissions generated within the OCS air permit area would impact each nearby county in turn. Instead, only a portion of emissions generated within the OCS air permit area would actually reach land, depending on wind conditions at the time of emission.

Table 3.4-15. Geographic Analysis Area Offshore Cumulative Operations and Maintenance Emissions (tpy)

Source, State	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
New York							
RWF-New York	51.2	205.3	6.9	6.7	0.1	3.0	14,506
RWF-OCS	207.6	847.7	27.4	26.6	0.6	12.4	57,820
Total New York Emissions	**258.8**	**1,053.0**	**34.3**	**33.3**	**0.7**	**15.4**	**72,326**
Percentage of Kings County, New York, emission inventory	0.44%	7.76%	0.69%	1.30%	0.15%	0.09%	1.41%
Percentage of Suffolk County, New York, emission inventory	0.18%	5.18%	0.35%	0.86%	0.06%	0.05%	0.69%
Rhode Island							
RWF-Rhode Island	3.3	13.0	0.4	0.4	0.0	0.3	1,001
RWF-OCS	207.6	847.7	27.4	26.6	0.6	12.4	57,820
Total Rhode Island Emissions	**210.9**	**860.7**	**27.8**	**27.0**	**0.6**	**12.7**	**58,821**
Percentage of Washington County, Rhode Island, emission inventory	1.45%	33.46%	2.37%	4.55%	0.58%	0.17%	9.16%

Source: Tech Environmental (2021)

Notes:

RWF-New York = the portion of RWF O&M emissions that would occur outside the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Montauk, Port Jefferson, and the Port of Brooklyn.

RWF-Rhode Island = the portion of RWF O&M emissions that would occur beyond the OCS permit area and within 15.5 miles from shore during transit to and from the Port of Providence and the Port of Davisville at Quonset Point.

RWF-OCS = the portion of RWF construction emissions that occur within the OCS permit area.

The Proposed Action would also have a noticeable contribution on existing GHG emissions. The construction and installation, O&M, and the eventual decommissioning of the Proposed Action would generate approximately 515,248 metric tons more CO_2e emissions over the No Action Alternative within the OCS air permit area. However, these contributions are small in proportion to aggregate national and global emissions. In 2019, U.S. GHG emissions totaled 6,558 million metric tons of CO_2e (EPA 2021c).

While cumulative air emissions in the region would increase during construction, the Project could also contribute to a long-term, cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. As presented in Table 3.4-12, the Proposed Action would avoid an estimated minimum of 235 tons of NO_X, 103 tons of SO_2, 41 tons of $PM_{2.5}$, 26 tons of VOC, 37 tons of NH_3, and 1,415,690 tons of CO_2 every year and would avoid an estimated maximum of 292 tons of NO_X, 126 tons of SO_2, 51 tons of $PM_{2.5}$, 33 tons of VOC, 46 tons of NH_3, and 1,771,440 tons of CO_2 every year by providing energy generation that existing fossil fuel–generated energy sources would have otherwise provided (EPA 2020b). This represents up to an estimated 5.3% to 6.2% increase in avoided emissions over the No Action Alternative on an annual basis. When combined with estimated avoided emissions under the No Action Alternative (see Table 3.4-3), offshore wind projects could cumulatively avoid an estimated minimum of 4,149 tons of NO_X, 1,759 tons of SO_2, 724 tons of $PM_{2.5}$, 471 tons of VOC, 653 tons of NH_3, and 25,266,226 tons of CO_2 every year and would avoid an estimated maximum of 5,772 tons of NO_X, 2,440 tons of SO_2, 1,008 tons of $PM_{2.5}$, 655 tons of VOC, 909 tons of NH_3, and 35,186,254 tons of CO_2 every year.

Based on the above considerations, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would be **moderate** adverse, although regional air quality could be improved over the Project lifecycle when compared to the No Action Alternative.

Onshore Activities and Facilities

Air emissions and climate change: Project onshore facilities would result in temporary to long-term negligible to minor adverse air emissions as a result of on-road and non-road equipment use. The Proposed Action onshore facility construction NO_X emissions are approximately 5.5% of Providence County, Rhode Island's annual NO_X emissions, 16.9% of Washington County, Rhode Island's annual NO_X emissions and 20.3% of Kent County, Rhode Island's annual NO_X emissions.

Most O&M annual emissions of regulated pollutants were between 0.29% and 2.94% of Kent, Providence, or Washington Counties' annual emissions. Annual O&M emissions from onshore facilities would have a negligible adverse impact, ranging from < 0.01% to 0.01% of Kent, Providence, and Washington Counties' annual emissions. When combined with other onshore sources of air emissions, cumulative impacts on air quality would be long term **minor** adverse.

3.4.2.2.4 Conclusions

Construction and installation and decommissioning activities would cause increased air emissions temporarily. Emission sources from O&M activities would primarily use vehicles and vessels that emit less emissions than during construction and installation and decommissioning activities, and fewer annual trips would be needed. Therefore, BOEM expects the impact on air quality from the Proposed Action alone to be **minor** adverse due to air emissions from construction activities. While cumulative air

emissions in the region would increase during construction, it is important to note that the Proposed Action could also contribute to a long-term net decrease in emissions by substituting some existing fossil fuel sources with a renewable source. By substituting some fossil fuel sources with a renewable source with less emissions, the Proposed Action would generate long-term **minor** beneficial impacts to regional air quality by contributing to a long-term net decrease in emissions in the region.

Considering all the IPFs together, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action when combined with other past, present, and reasonably foreseeable activities would remain **moderate** adverse, although regional air quality could be improved when compared to the No Action Alternative.

3.4.2.3 Alternatives C, D, E, and F

Table 3.4-7 provides a summary of IPF findings for these alternatives.

3.4.2.3.1 Conclusions

Although Alternatives C through F would reduce the number of allowable WTGs and their associated IACs, which would likely have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects the impacts from each alternative would be similar to the Proposed Action: **minor** adverse due to air emissions from construction activities. Project O&M would also contribute to long-term **minor** beneficial impacts by substituting some fossil fuel sources of electricity generation with a lower emitting renewable source and thus, would result in a net reduction in cumulative air emissions in the region.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that each alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impact that would be short term **minor** adverse and long term **minor** beneficial). The overall cumulative impacts of each alternative on air quality when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse, with potential regional improvements to air quality when compared to the No Action Alternative. Overall adverse effects would be notable, but the resource would recover completely from adverse impacts.

3.4.2.4 Mitigation

No potential additional mitigation measures for air quality are identified in Table F-2 in Appendix F.

3.5 Bats

3.5.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Bats

Geographic analysis area: Although historic anecdotal observations of bats up to 1,212 miles (1,950 km) offshore North America exist, recent offshore observations of tree bats range from 10.5 to 26.0 miles (16.9 to 41.8 km) (Hatch et al. 2013). For this reason, and to capture most of the movement range for migratory bat species, the GAA for bats consists of the United States coastline from Maine to Florida and extends 100 miles (160.9 km) offshore and 5 miles (8.05 km) inland to capture the movement range for species in this group (Figure 3.5-1).

Northern long-eared bats (*Myotis septentrionalis*) and other cave bats typically do not occur on the OCS. Tree bats are long-distance migrants; their range includes most of the Atlantic coast from Florida to Maine. Although these species have been documented on the open ocean and could encounter WTGs, use of offshore habitat is thought to be limited and generally restricted to spring and fall migration. The onshore limit of the GAA is 0.5 mile (0.8 km) inland to cover onshore habitats used by the bat species that may be affected by offshore components of the proposed Project as well as those species that could be affected by proposed onshore Project components. The onshore limit of the GAA is intended to cover most of the onshore habitat used by those bat species that may encounter the Project during most of their life cycles.

Affected environment: This section provides information on existing bat species and habitat trends from past and present activities. Bats within the GAA are subject to pressure from ongoing activities generally associated with onshore impacts, including onshore construction and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to result in impacts on bat species. The Vineyard Wind Final EIS (BOEM 2021a), the South Fork Wind Farm (SFWF) Final EIS (BOEM 2021b), and COP Appendix AA (Biodiversity Research Institute [bri] 2021) provide detailed discussions of existing bat resources as well as bat species and habitat trends along the East Coast, which are incorporated by reference. Appendix E1 of this EIS provides additional information regarding past and present activities and associated impacts to bats.

Eight bat species are present in the state of Rhode Island, five of which are likely year-round residents. Bat species that may occur in the offshore and onshore portions of the Lease Area are the long-distance migrants and the non-migrating cave-dwelling bats. Long-distance migrants consist of hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*). Non-migratory cave dwellers consist of northern long-eared bat, little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), big brown bat (*Eptesicus fuscus*), and tri-colored bat (*Perimyotis subflavus*) (see Table 2-3 in COP Appendix AA [bri 2021]). Both groups of bats are nocturnal insectivores that use a variety of forested and open habitats for foraging during the summer (Barbour and Davis 1969). Cave-hibernating bats are generally not observed offshore (Dowling and O'Dell 2018) and in winter migrate from summer habitat to hibernacula in the region (Maslo and Leu 2013). Migratory tree bats fly to southern parts of the United States in the winter and have been observed offshore during migration (Hatch et al. 2013; Stantec Consulting Services Inc. [Stantec] 2016, 2018).

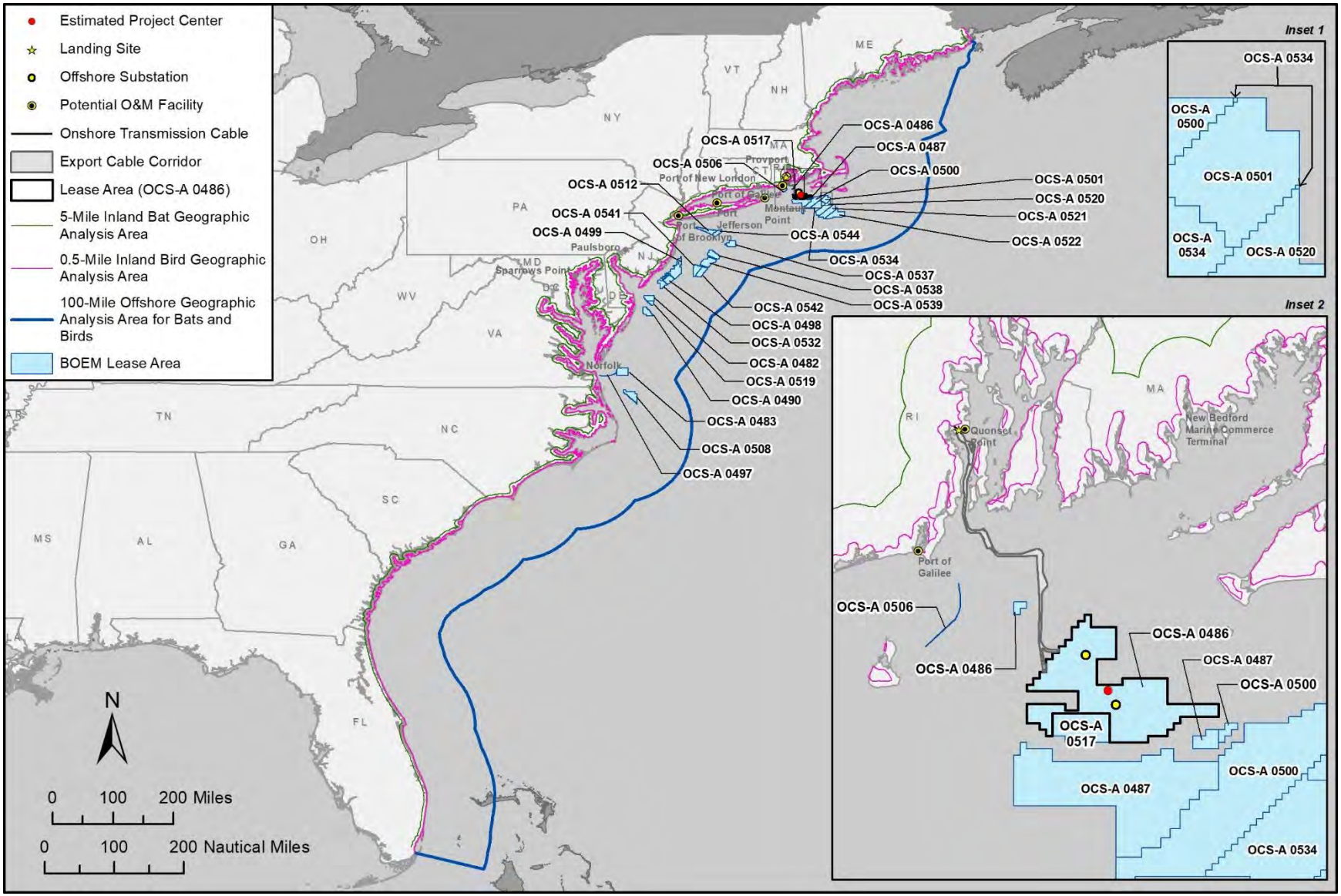

Figure 3.5-1. Geographic analysis area for bats.

Offshore

Although there is uncertainty on the specific movements of bats offshore, bats have been documented using the marine environment in the United States (Cryan and Brown 2007; Dowling and O'Dell 2018; Grady and Olson 2006; Hatch et al. 2013; Johnson et al. 2011; Stantec 2016). Bats have been observed to temporarily roost on structures, such as lighthouses on nearshore islands (Dowling et al. 2017). There is also historical evidence of bats, particularly eastern red bats, migrating offshore in the Atlantic (Hatch et al. 2013). In a mid-Atlantic bat acoustic study conducted during the spring and fall of 2009 and 2010 (86 nights), the maximum distance that bats were detected from shore was 13.6 miles (21.9 km), and the mean distance was 5.2 miles (8.4 km) (Sjollema et al. 2014). In Maine, bats were detected on islands up to 25.8 miles (41.6 km) from the mainland (Peterson et al. 2014). In the mid-Atlantic acoustic study (Sjollema et al. 2014), eastern red bats made up 78% (166 bat detections during 898 monitoring hours) of all bat detections offshore. This study also found that bat activity decreased as wind increased (Sjollema et al. 2014). In addition, eastern red bats were detected in the mid-Atlantic up to 27.3 miles (44 km) offshore, outside the vicinity of islands or other structures, by high-resolution video aerial surveys (Hatch et al. 2013). Shipboard acoustic surveys conducted by Stantec in 2017 detected over 900 bat passes (primarily long-distance migratory tree bats) within the adjacent proposed SFWF Lease Area, export cable route, and adjacent offshore and coastal areas. Eastern red bats accounted for 69% of calls detected, whereas silver-haired bats accounted for 13%. All other species accounted for less than 5% of calls that were identified to species level. Peak detections for all species occurred during the month of August, suggesting that most offshore movement is associated with fall migration (Stantec 2018).

Several studies highlight the relationship between bat activity and weather conditions. Acoustic monitoring within the footprint of the proposed SFWF in southern New England found 82% of recorded bat passes with corresponding weather data occurred when wind speeds were < 5.0 meters/second (m/s) and temperatures were ≥ 15.0°C (Stantec 2018). This occurred during 49% of nighttime hourly rounded weather data increments during the monitoring period from July 14 to November 15. These weather conditions most often occurred from August through September. Bat activity occurred primarily during nights with warmer temperatures and low wind speeds, which has been likewise documented in several other studies (Fiedler 2004; Reynolds 2006; Stantec 2016). Similar monitoring at the operational Block Island Wind Farm in Rhode Island found that 90% of bat passes occurred at times when wind speeds were below 5.0 m/s and temperatures were at or above 15.0°C (Stantec 2018). Both studies reported very little activity at temperatures below 15.0°C, and most activity was documented at wind speeds between 2 and 4 m/s. Smith and McWilliams (2016) developed predictive models of regional nightly bat activity using continuous acoustic monitoring at several locations in coastal Rhode Island. Bat activity was found to steadily decrease with decreasing temperatures, and departures from seasonally normal temperatures increasingly inhibited bat activity later in the season (September through October). This study found no association between wind speed and bat activity, which contrasts with most other literature that shows bat activity is associated with relatively low wind speeds (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005), although wind speed data were regional and not site specific.

Cave-hibernating bats hibernate regionally in caves, mines, and other structures and primarily feed on insects in terrestrial and freshwater habitats. These species generally exhibit lower activity in the offshore environment than migratory tree bats (Sjollema et al. 2014), with movements primarily occurring during the fall. In the region, the maximum distance *Myotis* bats were detected offshore was 7.2 miles (11.5 km) (Sjollema et al. 2014). A recent nanotag tracking study on Martha's Vineyard recorded little brown bat

(n = 3) movements off the island in late August and early September, with one individual flying from Martha's Vineyard to Cape Cod (Dowling et al. 2017). Big brown bats (n = 2) were also detected migrating from the island later in the year (October–November) (Dowling et al. 2017). These findings are supported by an acoustic study conducted on islands and buoys in the Gulf of Maine that indicated the greatest percentage of activity in July–October (Peterson et al. 2014). Presence in the Lease Area is considered rare for this group given the use of the coastline as a migratory pathway by cave-hibernating bats is likely limited to their fall migration period; acoustic studies indicate lower use of the offshore environment by cave-hibernating bats; and cave-hibernating bats do not regularly feed on insects over the ocean (bri 2021).

Tree bats migrate south to overwinter and have been documented in the GAA's offshore environment (Hatch et al. 2013; Stantec 2018, 2019). Eastern red bats have been detected migrating from Martha's Vineyard late in the fall, with one individual tracked as far south as Maryland (Dowling et al. 2017). These results are supported by historical observations of eastern red bats offshore as well as recent acoustic survey results (Hatch et al. 2013; Peterson et al. 2014; Sjollema et al. 2014). Although little local data are available, shipboard and stationary acoustic surveys recorded several observations of bats flying over the ocean, with detections of migratory tree bats near the Lease Area (Stantec 2018). Tree bats may pass through the Lease Area during the migration period because they have been detected in the offshore environment primarily during late summer and fall. However, because bat movement offshore is generally limited to fall migration and bat activity offshore primarily occurs during wind speeds below 5.0 m/s, exposure to the Lease Area is expected to be low as the average wind speeds in the Lease Area are between 5 and 10 m/s with stronger wind in the winter (bri 2021:Section 4.2.4.1). Therefore, there is little evidence of bat use of the offshore environment and a low proportion of the population is exposed.

Onshore

In July 2020, vhb performed acoustic presence-absence surveys for the federally threatened northern long-eared bat along the onshore transmission cable route and within the proposed OnSS parcel (vhb 2021). Automated and qualitative analysis of acoustic data did not detect presence of the northern long-eared bat or the tri-colored bat, which is a candidate species for listing under the Endangered Species Act (ESA). Call data were auto classified with Bat Call Identification East, Version 2.8b, which resulted in the detection of the following species: big brown bat (n = 540 calls), eastern red bat (n = 891 calls), hoary bat (n = 23 calls), and silver-haired bat (n = 130 calls). Qualitative analysis of unknown species of concern calls confirmed 11 big brown bat calls and 135 eastern red bat calls (vhb 2021).

Special-Status Bat Species

The official species list generated by Information for Planning and Consultation (IPaC) on September 28, 2019, indicates that the federally threatened northern long-eared bat has the potential to occur within the footprint of the onshore facilities (vhb 2021). A Final 4(d) Rule specific to "take" prohibitions of the northern long-eared bat was published in the *Federal Register* on January 14, 2016 (U.S. Fish and Wildlife Service [USFWS] 2016). *Take* is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any species listed under the ESA. The IPaC list also indicates that there are no critical habitats associated with the northern long-eared bat within the GAA. The range of the federally endangered Indiana bat (*Myotis sodalis*) does not include Rhode Island, and historical records of the Indiana bat demonstrate its presence only in Berkshire and Hampden Counties in Massachusetts (last

recorded in 1939; Mass.gov 2019). The Indiana bat is also not among species of bats documented offshore (Pelletier et al. 2013; Stantec 2016). For these reasons, this assessment focuses solely on the potential occurrence of northern long-eared bats within the GAA. A detailed species account and further information on this species is provided in the RWF biological assessment (BA) prepared for the USFWS (BOEM 2022).

Northern long-eared bats are not expected to occur within the Lease Area. A recent tracking study on Martha's Vineyard (n = 8; July–October 2016) did not record any offshore movements, and bats were presumed to hibernate on the island (Dowling et al. 2017). However, shipboard acoustic sampling near the SFWF detected a single northern long-eared bat call 21.1 miles (34 km) offshore (Stantec 2018). Most other northern long-eared bat passes detected during these surveys were 3 to 9 miles (5–14 km) offshore. Stationary acoustic detectors positioned on two turbines within the operational Block Island Wind Farm did not detect any northern long-eared bat calls (Stantec 2018, 2020). Similarly, vessel-based surveys at the construction site of the Block Island Wind Farm in 2016 did not detect any *Myotis* species (Stantec 2016). If northern long-eared bats were to migrate over water, most movements would likely be near the mainland. The related little brown bat has been documented migrating from Martha's Vineyard to Cape Cod, and northern long-eared bats may likewise migrate to mainland hibernacula from these islands in August and September (Dowling et al. 2017). Given that there is little evidence of use of the offshore environment by northern long-eared bats, exposure is expected to be minimal, and this species is not further assessed. This conclusion is also consistent with the Vineyard Wind BA (BOEM 2020).

3.5.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential bat impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Cable emplacement/maintenance: A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur in previously disturbed areas. Short-term temporary impacts associated with habitat loss or avoidance during cable emplacement/maintenance may occur, but no injury or mortality of bat individuals would be expected. Cable emplacement/maintenance is therefore expected to have **negligible** adverse impacts on bats.

Light: Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. The lack of bat carcasses reported during large-scale bird-related fatality events at illuminated lighthouses, lightships, and oil or research platforms indicates that bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018). The wind turbines may also be lit with aviation lighting; however, aviation lighting has not been found to influence bat collision risk at onshore facilities in North America (Arnett et al. 2008). Based on collision mortalities documented at onshore wind farms, the behavioral vulnerability to collision due to offshore lighting for all bat species would be **negligible** adverse.

Noise: Anthropogenic noise on the OCS associated with future offshore wind development, including noise from pile driving and construction activities (e.g., use of noise-producing heavy equipment or machinery), could impact bats on the OCS. Noise from pile driving would occur during installation of

foundations for offshore structures at a frequency of 4 to 6 hours at a time over 6 to 10 years. Construction activity would be short term, temporary, and highly localized. Further, the majority of these activities would take place during the day while bats are in torpor. A study evaluated the effect of noise on torpid bats and found that bats responded most strongly to colony and vegetation noise and most weakly to traffic noise (Luo et al. 2014). The study also documented evidence that torpid bats can rapidly habituate to repeated and prolonged noise disturbance, suggesting that traffic noise is less disturbing to torpid bats than colony or vegetation noise (Luo et al. 2014). Another study found that bats avoided foraging areas subjected to strong noise impacts (Schaub et al. 2008). This study suggests that foraging areas close to highways and other sources of intense broadband noises are degraded in their suitability as foraging areas for "passive listening" bats (Schaub et al. 2008). Because most construction activities would generally not be conducted during the active bat foraging period between twilight and sunrise, most noise generated from construction activities is not expected to impact bat foraging behavior. Luo et al. (2014) demonstrated that bat response to traffic noise was low relative to other stimuli (e.g., colony noise, vegetation) and that bats rapidly habituate to prolonged noise disturbance. Auditory impacts are not expected to occur because recent research shows that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Construction activities could generate noise sufficient to cause avoidance behavior by individual migrating tree bats (Schaub et al. 2008), thus potentially causing habitat-related impacts (i.e., displacement). These impacts would likely be limited to behavioral avoidance of pile driving and/or construction activities (e.g., use of noise-producing heavy equipment or machinery), and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are unlikely because little use of the OCS is expected by bats, and only during spring and fall migrations. Therefore, based on available information, noise impacts resulting from construction of offshore facilities would be temporary **negligible** adverse.

Some potential for short-term, temporary, and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. As discussed with offshore construction noise, recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Impacts would be limited to individuals roosting adjacent to onshore construction locations. Nighttime work may be required on an as-needed basis, which could impact foraging bats. Some temporary displacement and/or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be biologically significant. Some bats roosting near construction activities may be disturbed during construction, but they would move to a different roost farther from construction noise. This would not result in any impacts because frequent roost switching is common among bats (Hann et al. 2017; Whitaker 1998). Based on available information, noise impacts resulting from construction of the onshore facilities would be temporary **negligible** adverse.

Nonroutine activities associated with offshore wind facilities would generally require intense temporary activity to address emergency conditions. The noise made by onshore construction equipment or offshore repair vessels could temporarily deter bats from approaching the site of a given nonroutine event. Impacts on bats, if any, would be temporary and last only as long as repair or remediation activities were necessary to address these nonroutine events.

Given the temporary and localized nature of potential impacts and bats' expected biologically insignificant response, impacts on bats are expected to be **negligible** adverse. No individual fitness (i.e., a

bat's ability to survive and reproduce) or population-level impacts would occur as a result of onshore or offshore noise associated with future offshore wind development.

Presence of structures: In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand and will result in permanent habitat loss for local bat populations. However, the noticeable increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019b). The current bearing capacity of existing ports is considered suitable for wind turbines, requiring no port modifications for supporting offshore wind energy development (U.S. Department of Energy [2014]).

Using the assumptions in Table E-4 in Appendix E, the cumulative offshore wind activities scenario would include up to 3,008 WTGs on the OCS that could result in potential impacts on bats. Cave bats (including the federally threatened northern long-eared bat and the state-endangered eastern small-footed bat, little brown bat, and tri-colored bat) rarely occur offshore (even during fall migration) and, therefore, exposure to construction vessels during construction or maintenance activities, or the rotor swept zone (RSZ) of operating WTGs in the lease areas, is expected to be **negligible** adverse, if exposure occurs at all (Pelletier et al. 2013).

Tree bats, however, may pass through offshore WEAs on the OCS during the fall migration, with limited potential for migrating bats to encounter vessels during construction and decommissioning of WTGs, electric service platforms, and offshore export cable corridors, although structure and vessel lights may attract bats because of the increased prey abundance. As discussed above, although bats have been documented at offshore islands, relatively little bat activity has been documented in open water habitat similar to the conditions in the WEAs (Stantec 2018, 2020). Several studies, such as Cryan and Barclay (2009), Cryan et al. (2014), and Kunz et al. (2007), discuss several hypotheses as to why bats may be attracted to WTGs. Many of these, including the creation of linear corridors, altered habitat conditions, or thermal inversions, would not apply to WTGs on the Atlantic OCS (Cryan and Barclay 2009; Cryan et al. 2014; Kunz et al. 2007). Other hypotheses associated with the Atlantic OCS regarding bat attraction to WTGs include bats perceiving the WTGs as potential roosts, potentially increased prey base, visual attraction, disorientation due to electromagnetic fields or decompression, or attraction due to mating strategies (Arnett et al. 2008; Cryan 2007; Kunz et al. 2007). However, no definitive answer as to why, if at all, bats are attracted to WTGs has been postulated, despite intensive studies at onshore wind facilities. For this reason, some bats may encounter, or perhaps be attracted to, the expected structures (i.e., electric service platforms and non-operational WTG towers) to opportunistically roost or forage. However, bats' echolocation abilities and agility make it unlikely that these stationary objects (i.e., electric service platforms and non-operational WTGs) or moving vessels would pose a collision risk to migrating individuals. This assumption is supported by the evidence that bat carcasses are rarely found at the base of onshore turbine towers (Choi et al. 2020).

Tree bat species that may encounter operating WTGs in the offshore lease areas include the eastern red bat, the hoary bat, and the silver-haired bat. Offshore O&M would present a seasonal risk factor to migratory tree bats that may use offshore habitats during fall migration. Although some potential exists for migrating tree bats to encounter operating WTGs during fall migration, the overall occurrence of bats

on the OCS is relatively very low (Stantec 2016). With the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, individual bats migrating over the OCS within the RSZ of project WTGs would likely pass through projects with only slight course corrections, if any, to avoid operating WTGs. Further, unlike terrestrial migration routes there are no landscape features that would concentrate bats and increase exposure to the WEAs on the OCS (Baerwald and Barclay 2009; Cryan and Barclay 2009; Fiedler 2004; Hamilton 2012; Smith and McWilliams 2016). This combined with the expected infrequent and limited use of the OCS by migrating tree bats suggests very few individuals would encounter operating WTGs or other structures associated with future offshore wind development. Additionally, the potential collision risk to migrating tree bats varies with climatic conditions. For example, bat activity is associated with relatively low wind speeds and warm temperatures (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005). Given the rarity of tree bats in the offshore environment, the turbines being widely spaced apart, and the patchiness of expected projects on the OCS, the likelihood of collisions is expected to be low. Additionally, the likelihood of a migrating individual encountering one or more operating WTGs during adverse weather conditions is extremely low because bats have been shown to suppress activity during periods of strong winds, low temperatures, and rain (Arnett et al. 2008; Erickson et al. 2002).

For these reasons, the likelihood of exposure of tree bats to construction vessels during construction or maintenance activities, or the RSZ of operating WTGs in the lease areas, is very low, and therefore related impacts are expected to be **negligible** adverse.

3.5.1.2 Conclusions

Under the No Action Alternative, the Project would not be built. Impacts from ongoing future non–offshore and offshore wind development activities would still occur. BOEM expects ongoing activities, future non–offshore wind development, and future offshore wind development to have continuing temporary to permanent impacts (e.g., disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change. BOEM anticipates that the potential impacts of ongoing activities would be **negligible** adverse. In addition to ongoing activities, BOEM anticipates that the impacts of planned actions other than offshore wind development may also contribute to impacts on bats, including increasing onshore construction (see Appendix E1), but that these impacts would be **negligible** adverse. BOEM expects the combination of ongoing and planned actions other than offshore wind development to result in **negligible** adverse impacts on bats. Although the impacts from a substitute project may differ in location and time, depending on where and when offshore wind facilities are developed to meet the remaining demand, the nature of impacts and the total number of WTGs would be similar either with or without the Proposed Action. The No Action Alternative would forgo applicant-committed postconstruction acoustic monitoring for bats and annual mortality reporting. Their results could provide an understanding of the effects of offshore wind development, benefit the future management of these species, and inform planning of other offshore development. However, ongoing and future surveys and monitoring could still supply similar data.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with future offshore wind activities in the GAA would result in **negligible** adverse impacts from ongoing climate change, lighting, interactions with operating WTGs on the OCS, and onshore habitat loss. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration,

as well as cave bats not typically occurring on the OCS, the IPFs associated with future offshore wind activities that occur offshore would not appreciably contribute to overall impacts on bats. Future offshore wind development could result in some potential for temporary disturbance and permanent loss of onshore bat habitat. However, habitat removal is anticipated to be minimal when compared to other past, present, and reasonably foreseeable activities. Any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the GAA.

3.5.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on bats include the number, size, and location of WTGs; the location of the OnSS and ICF; the type of lighting to be used; the location of construction within the landfall work area and within the transmission cable envelope; and the time of year during which construction occurs. Impacts associated with construction of the onshore elements of the Proposed Action during the active season for bats (generally April through October) could be avoided if onshore construction occurs outside this time frame.

The following EPMs would be implemented to minimize potential impacts to bats:

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
- The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for bats across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse impact are excluded from Chapter 3 and provided in Table E1-4 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.5-1 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

The overall impact to bats from any action alternative would be **minor** adverse, as the effects would be small, and the resource would recover completely, with no mitigating action required. The conclusion section for each alternative analysis provides additional rationale for this impact determination.

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Table 3.5-1. Alternative Comparison Summary for Bats

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Cable emplacement/ maintenance	Only small amounts of habitat removal, if any, would be required by onshore power infrastructure construction and would occur in previously disturbed areas. Short-term temporary impacts associated with habitat loss or avoidance during cable emplacement/maintenance may occur, but no injury or mortality of bat individuals would be expected. Cable emplacement/maintenance is therefore expected to have **negligible** adverse impacts on bats.	**Onshore**: The onshore transmission cable route would be located primarily in unvegetated and previously disturbed or developed ROWs that do not provide high-quality habitat for bats; however, some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas comprised of upland forest and shrubland. The preferred transmission cable route is an approximate 1-mile (1.6-km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. Based on Project timing, the limited area of effect relative to available habitat, and the proposed impact avoidance and minimization measures, adverse construction impacts of the Proposed Action on northern long-eared bat would be **negligible** adverse. O&M impacts resulting from vegetation clearing would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season and therefore, **negligible** adverse. Impacts from land disturbance during decommissioning would be similar to those described within the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary. Onshore construction and installation would add to other limited onshore bat habitat disturbance actions through the removal of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest at the ICF but would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Therefore, the cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.	**Onshore**: Alternatives C through F would not alter onshore activities. Therefore, construction, O&M, and decommissioning impacts would be the same as those described for the Proposed Action: short term **negligible** adverse. Likewise, cumulative impacts would be the same as those described for the Proposed Action: short term **negligible** to **minor** adverse impacts.			
Light	Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. But based on collision mortalities documented at onshore wind farms, the behavioral vulnerability to collision due to offshore lighting for all bat species would be **negligible** adverse.	**Offshore**: Bats may demonstrate attraction to or avoidance of construction vessels installing offshore facilities. Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Thus, behavioral changes due to lighting on construction vessels would be temporary, and impacts to bats would be **negligible** adverse, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF. Lighting during the O&M phase of the Project would be limited, which should reduce insect and potential bat attraction (Stantec 2018). Revolution Wind would comply with FAA (2018) and BOEM (2021c) requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on bat species. Overall, collision-related mortality or injury from lighting at the offshore facilities could result in **negligible** to **minor** adverse impacts to bats at the RWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF. The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the offshore environment. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. Ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area.	**Offshore**: No measurable change from Proposed Action construction impacts is anticipated for Alternatives C through F because the number and duration of construction vessels and work areas requiring nighttime lighting would be the same as described for the Proposed Action. Alternatives C through F would reduce operational nighttime lighting due to a reduced number of lighted structures, thereby negligibly decreasing the risk of bat injury or mortality from collision with WTGs. However, impacts to bats from offshore lighting under these alternatives would likely be the same as those described for the Proposed Action: **negligible** to **minor** adverse. Alternatives C through F would add up 56 to 93 new WTGs with red flashing aviation hazard lighting to the offshore environment. Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. These lights could serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. Ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, Alternatives C through F, when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		Onshore: Most construction activities would occur during the day over the approximately 1-year construction period for the onshore facilities, impacts from lighting on bats would be **negligible** adverse. During the O&M of the OnSS and ICF, general yard lighting would be used for assessment of equipment. In general, lighting would be off at night unless there is work in progress or lights are left on for safety and security purposes. Because the use of lighting at night is expected to be infrequent, the impacts it has on temporary bat displacement and/or behavior disruption would be **negligible** adverse. Lighting from construction and operations could add to baseline light sources and activities associated with other onshore projects. When considered in the context of the other nearby commercial and industrial lighting within the GAA, BOEM expects **negligible** adverse cumulative impacts to bats.	**Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as those described for the Proposed Action: temporary to short term **negligible** adverse.			
Noise	Anthropogenic noise on the OCS associated with future offshore wind development, including noise from pile driving and construction activities (e.g., use of noise-producing heavy equipment or machinery), could impact bats on the OCS. Construction activity would be short term, temporary, and highly localized; however, no auditory impacts on bats would be expected. Given the temporary and localized nature of potential impacts and bats' expected biologically insignificant response, impacts on bats are expected to be **negligible** adverse. No individual fitness (i.e., a bat's ability to survive and reproduce) or population-level impacts would occur as a result of onshore or offshore noise associated with future offshore wind development.	**Offshore**: Pile-driving noise and offshore construction noise associated with the Proposed Action would be short term, temporary, and highly localized and is expected to result in **negligible** adverse impacts. Increases in activity and associated disturbances during RWF maintenance activities would have a short-term **negligible** adverse impact on bats because of the limited additional vessel activity and low likelihood of bat occurrence near the RWF. There would also be no impacts to bats during O&M of the offshore RWEC because these components are underwater, and there would be no routine maintenance at these components. Pile-driving and other construction noise and activity associated with the Proposed Action would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Therefore, the cumulative impact of the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.	**Offshore**: Alternatives C through F would slightly decrease construction impacts on bats from noise associated with pile driving for WTGs as compared to the Proposed Action. Impacts, if any, would be temporary, limited to behavioral avoidance, and localized and would be the same as those described for the Proposed Action: short term **negligible** adverse. No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: short term **negligible** adverse. Pile driving and other construction noise and activity associated with Alternatives C through F would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, Alternatives C through F's contribution would be limited in duration and cease when construction ends. Therefore, these alternatives when combined with other past, present, and reasonably foreseeable projects would result in short- to long-term **negligible** to **minor** adverse cumulative impacts to bats.			
		Onshore: Some potential for short-term, temporary, and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. Therefore, noise impacts resulting from construction and installation of the onshore facilities would be temporary **negligible** adverse. Most activities would generally not be conducted during the active bat foraging period between twilight and sunrise, thus noise from maintenance activities is not expected to impact bat foraging behavior. Noise and traffic resulting from operation of the onshore facilities would be temporary and **negligible** adverse. Impacts to bats from noise during decommissioning would be similar to that described for construction activities. Construction noise and activities associated with construction and operation of the onshore facilities could add to baseline noise and activity associated with other onshore projects with overlapping construction periods. Normal operation of the OnSS would generate continuous noise, but BOEM	**Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		expects long-term **negligible** adverse associated impacts when considered in the context of the other commercial and industrial noises nearby.				
Presence of structures	Some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. However, the noticeable increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019b). Cave bats rarely occur offshore and given the rarity of tree bats in the offshore environment, the likelihood of exposure of cave and tree bats to construction vessels during construction or maintenance activities, or the RSZ of operating WTGs in the lease areas, is very low. Therefore, related impacts are expected to be **negligible** adverse.	**Offshore**: Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Behavioral vulnerability to collision with construction equipment is expected to be **negligible** adverse. Collisions between bats and OSSs could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration. Thus, the risk of injury and/or mortality to bats would be **negligible** to **minor** adverse. The structures associated with the Proposed Action, and the consequential **negligible** to **minor** adverse impacts, would remain at least until decommissioning of the Project is complete. The Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats.	**Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required. However, because bat exposure to vessels and installation infrastructure would be temporally limited to the construction period, the behavioral vulnerability to collision with construction equipment under Alternatives C through F is expected to be the same as described for the Proposed Action: short term **negligible** adverse. During operation, Alternatives C through F would reduce the number of WTGs as compared to the Proposed Action and potentially allow for improved maneuverability for bats through the Lease Area and negligibly decreases the risk of injury or mortality from collision with WTGs. However, impacts to bats from the presence of structures under these alternatives would not be substantially reduced and would likely be the same as those described for the Proposed Action: long term **negligible** to **minor** adverse. Alternatives C through F would add 56 to 93, additional WTGs and up to two OSSs to the No Action Alternative. Therefore, the total cumulative structures would be 3,066 to 3,103. Impacts to migration patterns or collision risk from these additional turbines would persist until decommissioning is complete. However, the Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, these alternatives, when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats.			
		Onshore: Impacts on mortality and injury from the onshore construction operations would be avoided by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bats (see COP Table ES-1). Therefore, these temporary impacts, if any, from construction equipment and ongoing activity would be **negligible** adverse. The OnSS and ICF would be visible structures that would result in permanent bat habitat conversion and loss. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of bats. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Collisions between bats and onshore facilities could cause mortality. However, in general, these objects would likely not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Therefore, the impacts to bats from the presence of onshore facilities would be long term **negligible** adverse**.** The contribution of the Proposed Action to cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. The combined impacts on bats from habitat loss would likely be long term **negligible** adverse given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity.	**Onshore**: Alternatives C through F would not alter onshore activities. Therefore, impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** adverse.			

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3.5.2.2 Alternative B: Impacts of the Proposed Action Alternative on Bats

3.5.2.2.1 Construction and Installation

Offshore Activities and Facilities

Light: Bats may demonstrate attraction to or avoidance of construction vessels installing offshore facilities, particularly if insects (i.e., prey) are drawn to the lights of the vessels (BOEM 2014). Exposure to vessels and installation infrastructure would be temporally limited to the construction period. Thus, behavioral changes due to lighting on construction vessels would be temporary, and impacts to bats would be **negligible** adverse, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.

Noise: Pile-driving noise and offshore construction noise associated with the Proposed Action would be short term, temporary, and highly localized and is expected to result in **negligible** adverse impacts. Auditory impacts are not expected to occur as recent research shows that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, would be limited to behavioral avoidance of pile-driving and/or construction activities, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

Presence of structures: Bats are expected to seasonally occur in the Lease Area while migrating, commuting, or foraging. Bats were observed roosting aboard support vessels during the construction of the Block Island Wind Farm (Stantec 2016), suggesting the presence of artificial roosting structures may provide some benefit to bats in the offshore environment. Bats are well known for their ability to detect objects with echolocation (Horn et al. 2008; Johnson et al. 2004) and thus are unlikely to collide with stationary structures (Cryan 2011). Further, exposure to vessels and installation infrastructure would be temporally limited to the construction period. Behavioral vulnerability to collision with construction equipment is expected to be **negligible** adverse.

Onshore Activities and Facilities

Cable emplacement/maintenance: The preferred transmission cable route is an approximately 1-mile (1.6-km) route, that would predominantly follow along paved roads or previously disturbed areas such as parking lots that do not provide high-quality habitat for bats. However, some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas composed of upland forest and shrubland and would be approximately the same length (see Section 3.8). Impacts associated with construction of the onshore transmission cable could occur if construction activities take place during the active season for bats (generally April through October). Such activities may result in injury or mortality of individual bats, particularly juveniles as they are unable to flush from a roost if occupied by bats at the time of removal. However, tree and shrub removal would occur outside the bat roosting period (from May 1 through August 15) when feasible (see COP Table ES-1), thus limiting the potential for direct injury or mortality from the removal of occupied roost trees. There would be some potential for adverse impacts on bats as a result of the loss of potentially suitable roosting and/or foraging habitat, but these impacts would be **negligible** adverse.

BOEM anticipates that **negligible** adverse impacts, if any, would occur with adherence to USFWS northern long-eared bat conservation measures and that **negligible** adverse habitat impacts would not result in individual fitness or population-level effects given the limited amount of habitat removal and the

presence of high-quality bat habitat in the vicinity. Based on Project timing, the limited area of effect relative to available habitat, and the proposed impact avoidance and minimization measures, adverse impacts of the Proposed Action on northern long-eared bat would be **negligible** adverse. A detailed impacts analysis to northern long-eared bats from Project construction activities is provided in the USFWS BA (BOEM 2022).

Light: Some overnight lighting would occur during construction of the onshore facilities. Wildlife typically not exposed to light, such as bats, may behave differently if exposed to light at nighttime. Because most construction activities would occur during the day over the approximately 1-year construction period for the onshore facilities, impacts from lighting on bats would be **negligible** adverse.

Noise: Some potential for short-term, temporary, and localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected. As discussed with offshore construction noise, recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Based on available information discussed in Section 3.5.1.1, noise impacts resulting from construction and installation of the onshore facilities would be temporary **negligible** adverse.

Presence of structures: Visible structures (i.e., construction equipment) would be present during construction of the onshore facilities. Collisions between bats and vehicles or construction equipment could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). The operational footprints of the OnSS and ICF would result in habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards. The ICF would result in a loss of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would create a loss of 3.8 acres (1.5 ha) of mixed oak/white pine forest and 0.6 acre (0.2 ha) of ruderal pitch pine barren. Together, these losses represent a relatively small fraction of the 52 acres (21 ha) of contiguous bat habitat identified in the *Rhode Island Wildlife Action Plan* (RIWAP) (vhb 2021). Impacts on mortality and injury from the onshore construction operations would be avoided by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bats (see COP Table ES-1). Therefore, these temporary impacts, if any, from construction equipment and ongoing activity would be **negligible** adverse.

3.5.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Light: Lighting sources on the WTGs and OSSs may serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights. However, bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018), and aviation lighting has not been found to influence bat collision risk at onshore facilities in North America (Arnett et al. 2008). Lighting during the O&M phase of the Project would be limited, which should reduce insect and potential bat attraction (Stantec 2018). Revolution Wind would comply with FAA (2018) and BOEM (2021c) requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on bat species. Overall, collision-related mortality or injury from lighting at the offshore facilities could result in **negligible** to **minor** adverse impacts to bats at the RWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the RWF.

Noise: Boat activity and noise already occur within and adjacent to the Lease Area based on existing levels of vessel traffic, as described in Section 3.16. Increases in activity and associated disturbances during RWF maintenance activities would have a short-term **negligible** adverse impact on bats because of the limited additional vessel activity and low likelihood of bat occurrence near the RWF. There would also be no impacts to bats during O&M of the offshore RWEC because these components are underwater, and there would be no routine maintenance at these components.

Presence of structures: During Project O&M, injury or mortality from collision with WTGs represents the greatest potential risk to bats. WTGs and other offshore facilities may also provide roosting opportunities for bats. Collisions between bats and OSSs could cause injury and/or mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Additionally, individual bats could collide with WTGs, resulting in mortality or injury. It is difficult to confirm bat fatalities at offshore WTGs; however, offshore bat occurrences are infrequent and primarily seasonal (during migration), and activity declines as the distance from shore increases. Existing data from meteorological buoys provide the best opportunity to further define bat use of open-water habitat far from shore where Project WTGs are proposed. Relatively few bat passes were detected at meteorological buoy sites, and use was sporadic when compared to sites on offshore islands (Stantec 2016). In general, the bat species assessed are not expected to regularly forage in the Lease Area, but some may be present during migration, particularly in the fall (BOEM 2012; Stantec 2018).

Specific weather conditions may contribute to bat mortality from turbines. Mortality data from onshore wind farms indicate that bat collision mortality is expected to occur mainly on nights with calm winds during migratory periods as relatively more bats are migrating at greater altitudes in favorable conditions (Arnett et al. 2008). Likewise, coastal and offshore acoustic studies (Stantec 2016) found that greater wind speeds and cool temperatures have an adverse effect on bat activity. However, during fall migration, bats may take advantage of favorable wind directions and may be more likely to fly during colder weather (Stantec 2016). Most offshore bat activity took place at wind speeds less than 5 m/s. Because average wind speeds in the Lease Area are between 5 and 10 m/s, with stronger wind in the winter, bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration. Thus, the risk of injury and/or mortality to bats would be **negligible** to **minor** adverse. The structures associated with the Proposed Action, and the consequential **negligible** to **minor** adverse impacts, would remain at least until decommissioning of the Project is complete. Impacts from O&M of the RWF to the listed northern long-eared bat are not expected because of their low collision risk and the rarity of their occurrence offshore. A detailed impacts analysis to northern long-eared bats from Project operation and decommissioning is provided in the USFWS BA (BOEM 2022).

Onshore Activities and Facilities

Cable emplacement/maintenance: Hazard tree removal would be performed on a cyclical basis to inspect and remove trees that may fall that are outside the edge of the maintained ROW. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Therefore, the impacts resulting from vegetation clearing would be **negligible** adverse. Impacts from land disturbance during decommissioning would be similar to those described within the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary.

Light: During the O&M of the OnSS and ICF, general yard lighting would be used for assessment of equipment. In general, lighting would be off at night unless there is work in progress or lights are left on for safety and security purposes. Insect prey could be drawn in by lighting at the OnSS and ICF and thus attract foraging bats. However, the surrounding area is currently developed, and lighting-related effects would be abated using minimum-intensity and motion-activated lighting and shielding and downward angling light sources where practicable. As during construction of the onshore facilities, lighting at night has the potential to temporarily displace bats and/or disrupt normal behavior. Because the use of lighting at night is expected to be infrequent, the impacts it has on temporary bat displacement and/or behavior disruption would be **negligible** adverse.

Noise: According to vhb's onshore acoustic assessment (vhb 2021), during O&M, the proposed OnSS and ICF would introduce new sources of sound, which are modeled to be 45.5 A-weighted decibels (dBA) equivalent sound level (Leq) or less when measured at the nearest anthropogenic sensitive receptors and fall within the ambient sound range measured at baseline conditions. Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Pickup trucks may be used to make routine visits to the OnSS and ICF during O&M. Occasional O&M emergency visits may necessitate bucket trucks, cranes, and similar vehicles. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to bats adjacent to the OnSS. However, most activities would generally not be conducted during the active bat foraging period between twilight and sunrise, thus noise from maintenance activities is not expected to impact bat foraging behavior. Luo et al. (2014) demonstrated that bat response to traffic noise was low relative to other stimuli (e.g., colony noise, vegetation) and that bats rapidly habituate to prolonged noise disturbance. Based on this available information, noise and traffic resulting from operation of the onshore facilities would be temporary and **negligible** adverse. Impacts to bats from noise during decommissioning would be similar to that described for construction activities.

Presence of structures: The OnSS and ICF would be visible structures that would result in permanent bat habitat conversion and loss. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the operational footprint of the onshore facilities. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of bats. However, mortality and injury risk would be reduced by observing time-of-year restrictions on vegetation removal to avoid bats' breeding season. Collisions between bats and onshore facilities could cause mortality. However, in general, these objects would likely not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018). Therefore, the impacts to bats from the presence of onshore facilities would be long term **negligible** adverse**.**

3.5.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Lighting: The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the offshore environment. Additionally, marine navigation lighting would include multiple flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from construction areas. These lights could serve as an attractant to bats as they navigate, or bats may be indirectly attracted to insect prey drawn to the lights.

However, the lack of bat carcasses reported during large-scale bird-related fatality events at illuminated lighthouses, lightships, and oil or research platforms indicates that bats do not appear to be as susceptible to these types of collision risks as some birds (Stantec 2018). As such, ongoing and future non–offshore wind activities are expected to cause permanent impacts, primarily driven by light from offshore structures and short-term and localized impacts from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to bats, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the Lease Area.

Noise: Pile-driving and other construction noise and activity associated with the Proposed Action would add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, the Proposed Action's contribution to noise impacts would be limited in duration and cease when construction ends. Therefore, the cumulative impact of the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and up to two OSSs to the No Action Alternative. Therefore, the total cumulative structures would be 3,110. Impacts to migration patterns or collision risk from these additional turbines would persist until decommissioning is complete. However, the Project's contribution to impacts on bats would be limited because migrating bats rarely use the OCS and the Project would account for less than 4% of the total future structures on the OCS. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term **negligible** to **minor** adverse cumulative impacts to bats.

Onshore Activities and Facilities

Cable emplacement/maintenance: The transmission cable envelope contains approximately 0.56 acre (0.22 ha) of mixed oak/white pine forest, 0.32 acre of softwood forest, 0.02 acre of ruderal grassland/shrubland, 0.008 acre of oak forest, and 0.006 acre of pitch pine barren (see Section 3.8). Onshore construction and installation would add to other limited onshore bat habitat disturbance actions. Land disturbance associated with cable emplacement could result in the loss of potentially suitable roosting and/or foraging habitat for bats. However, the preferred transmission cable route is an approximate 1-mile (1.6-km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots. Further, Revolution Wind and other future land developers would adhere to USFWS northern long-eared bat conservation measures. As a result, cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Therefore, the cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse impacts to bats.

Light: The Proposed Action would involve the use of some overnight lighting during construction and installation and during O&M and decommissioning of the onshore facilities. O&M lighting of facilities would be switch activated and would only occur when O&M activities are ongoing. Lighting from construction and operations could add to baseline light sources and activities associated with other onshore projects. Because the use of lighting at night is expected to be infrequent, the impacts it has on temporary bat displacement and/or behavior would be short term **negligible** adverse. When considered in

the context of the other nearby commercial and industrial lighting within the GAA, BOEM expects **negligible** adverse cumulative impacts to bats.

Noise: Construction noise and activities associated with construction and operation of the onshore facilities could add to baseline noise and activity associated with other onshore projects with overlapping construction periods. However, the Proposed Action's incremental contribution would be **negligible** adverse as it would be limited in duration and cease when construction ends. No individual fitness or population-level effects would be expected. Normal operation of the OnSS would generate continuous noise, but BOEM expects long-term **negligible** adverse associated impacts when considered in the context of the other commercial and industrial noises nearby.

Presence of structures: Onshore construction and installation would add to other limited onshore bat habitat disturbance actions through the removal of approximately 1.6 acres (0.6 ha) of mixed oak/white pine forest at the ICF. The OnSS would create a loss of 3.8 acres (1.5 ha) of mixed oak/white pine forest. This land disturbance could result in the loss of potentially suitable roosting and/or foraging habitat for bats. However, Revolution Wind and other future land developers would adhere to USFWS northern long-eared bat conservation measures, which would also minimize impacts to other roosting/foraging bat species. As a result, the contribution of the Proposed Action to cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. The combined impacts on bats from habitat loss would likely be long term **negligible** adverse given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Collisions between bats and structures have some limited potential to cause mortality. However, in general, these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures and therefore would not contribute to cumulative impacts to bats.

3.5.2.2.4 Conclusions

In summary, construction and installation, O&M, and decommissioning of the Proposed Action would have **negligible** to **minor** adverse impacts on bats, especially if conducted outside the active season. The main significant risk would be from operation of the offshore WTGs, which could lead to long-term **negligible to minor** adverse impacts in the form of collision-related mortality, although BOEM anticipates this to be rare. In the context of reasonably foreseeable environmental trends in the area, impacts of individual IPFs resulting from ongoing and planned actions, including the Proposed Action, would be **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the impacts from ongoing and planned actions, including the Proposed Action, would result in **negligible** to **minor** adverse impacts on bats in the GAA because of ongoing climate change, interactions with operating WTGs on the OCS, and onshore habitat loss. Future offshore wind activities are not expected to materially contribute to the IPFs discussed above. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration and that cave bats do not typically occur on the OCS, the IPFs associated with future offshore wind activities that occur offshore would not be expected to appreciably contribute to overall impacts on bats. Some potential for temporary disturbance and permanent loss of onshore habitat may occur as a result of future offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the GAA. The Proposed Action would contribute to the overall impact rating primarily through the permanent impacts due to onshore habitat loss. Thus, the overall impacts on bats would be **minor** adverse

because limited impacts are expected due to the minimal presence of bats within the Lease Area and bat populations would recover completely.

3.5.2.3 Alternatives C, D, E, and F

Table 3.5-1 provides a summary of IPF findings for these alternatives.

3.5.2.3.1 Conclusions

Alternatives C through F would reduce the number of WTGs, which subsequentially would reduce the potential collision risk for bats. Still, BOEM expects the overall impacts of these alternatives to bats would be similar to the Proposed Action: **negligible** to **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's contribution to the cumulative impacts would be similar to the Proposed Action (ranging from **negligible** to **minor** adverse, depending on the IPF). The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **minor** adverse.

3.5.2.4 Mitigation

Conducting marine construction activities during approved in-water work windows, which would be developed in consultation with NMFS and USFWS, could further reduce the expected negligible to minor long-term impacts on bats (see Table F-2 in Appendix F for details). Implementation of Revolution Wind's *Avian and Bat Post-Construction Monitoring Framework* (see Appendix G and COP Appendix AA) would not reduce impacts; however, the data gathered from the monitoring would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). If the reported postconstruction bird and bat monitoring results indicate that bird and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind would be required to recommend new mitigation measures or monitoring methods.

3.6 Benthic Habitat and Invertebrates (see section in main EIS)

3.7 Birds

3.7.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Birds

Geographic Analysis Area: The GAA for birds is the United States coastline from Maine to Florida (Figure 3.7-1). The offshore limit is 100 miles (160.9 km) from the Atlantic coast to capture the migratory movements of most species in this group. The onshore limit is 0.5 mile (0.8 km) inland from the Atlantic coast to cover onshore habitats used by the species that may be affected by offshore components of the Project as well as those species that could be affected by onshore Project components. The GAA was established to capture resident species and migratory species that winter as far south as South America and the Caribbean and those that breed in the Arctic or along the Atlantic coast that travel through the area.

Affected Environment: Table A.8.3-1 in Appendix A of the Vineyard Wind 1 final EIS (BOEM 2021a), the SFWF final EIS (BOEM 2021b), and COP Appendix AA (bri 2021), all incorporated here by reference, describe baseline conditions and the impacts, based on IPFs assessed, of ongoing and future activities other than offshore wind. These are further discussed below in the context of this Project. This section addresses potential impacts on bird populations that use inland, coastal, and offshore habitats, including both resident birds that use the Lease Area during all of (or portions of) the year and migrating birds with the potential to pass through the Lease Area during fall and/or spring migrations. Detailed information regarding species potentially present can be found in COP Appendix AA (bri 2021) and COP Appendix K (vhb 2021). Given the differences in life history characteristics and habitat use between offshore, inland, and coastal bird species, the sections below provide a separate discussion of each group. This section also discusses migratory birds as well as bald and golden eagles. In addition, this section addresses federally listed threatened and endangered species, but further information is provided in the Project BA prepared for the USFWS (BOEM 2022). Unless stated otherwise, special-status bird species are expected to be impacted similarly as described in general for other birds.

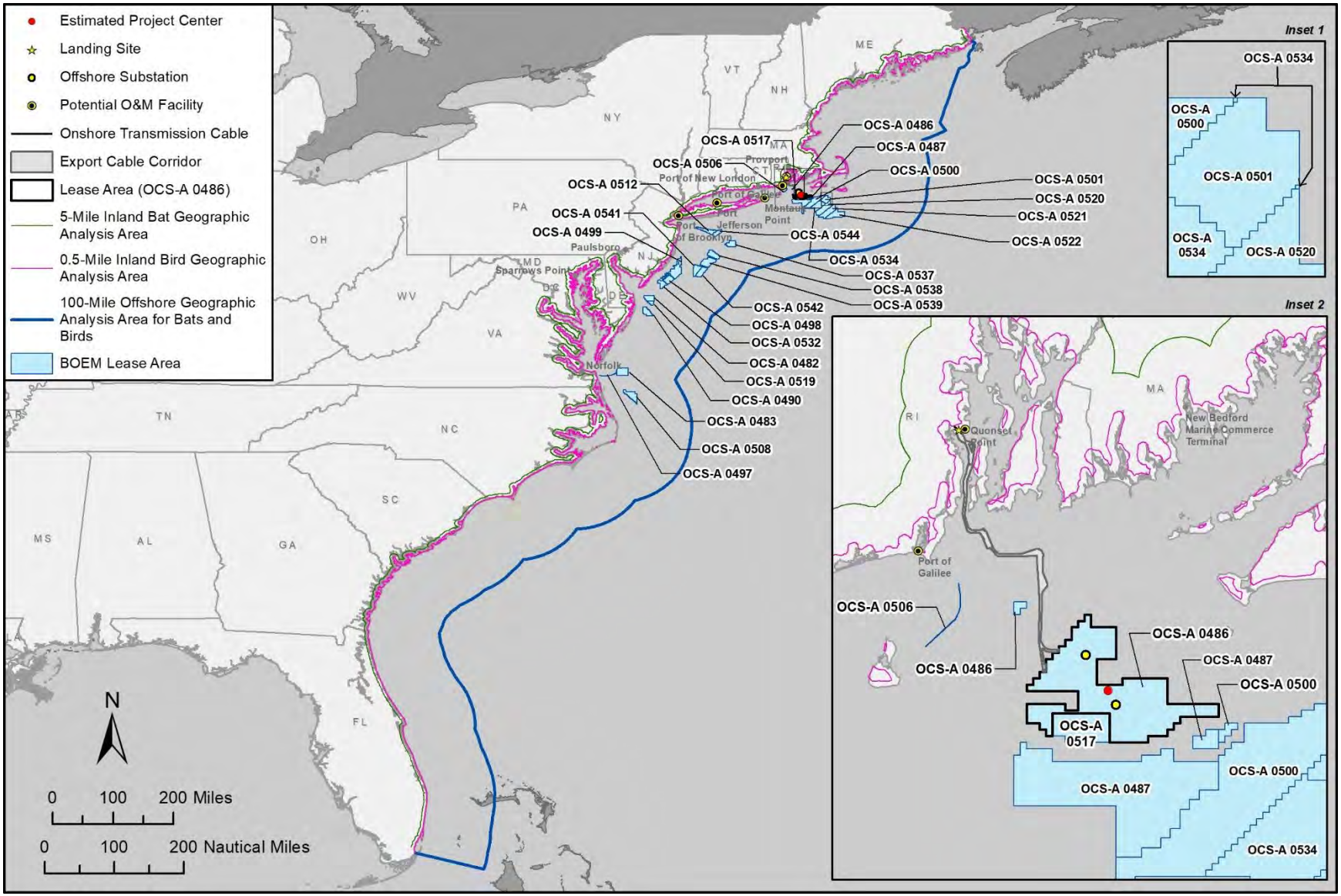

Figure 3.7-1. Geographic analysis area for birds.

Migrating Birds

The Atlantic Flyway, which follows the U.S. Atlantic coast, is an important migration route for many bird species moving from breeding grounds in New England and eastern Canada to winter habitats in North, Central, and South America. Bays, beaches, coastal forests, marshes, and wetlands provide important stopover and foraging habitat for migrating birds (MMS 2007). Both the onshore and offshore facilities associated with the Proposed Action are located within the Atlantic Flyway. Bird species using this flyway during spring and fall migrations have the potential to encounter proposed Project facilities. Despite the level of human development and activity present, the mid-Atlantic coast plays an important role in the ecology of many bird species. Chapter 4.2.9.3 of the Atlantic OCS EIS/EA (BOEM 2014a), incorporated here by reference, discusses the use of Atlantic coast habitats by migrating birds.

All native birds (except certain game birds protected under state laws) are protected under the Migratory Bird Treaty Act of 1918 (MBTA). The official list of migratory birds protected under the MBTA, and the international treaties that the MBTA implements, is found at 50 CFR 10.13. The MBTA makes it illegal to "take" migratory birds, their eggs, feathers, or nests.[1] Under Section 3 of Executive Order 13186, BOEM and the USFWS established an MOU on June 4, 2009, which identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats (MMS and USFWS 2009). The purpose of the MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies. One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MMS and USFWS 2009:Sections C, D, E(1), F(1–3, 5), G(6)).

Within the Atlantic Flyway, much of the bird migration activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several miles out onto the Atlantic OCS, whereas land birds tend to use a wider corridor extending from the coastline to tens of miles inland (Watts 2010). Although both groups may occur over land or water within the Atlantic Flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline. Migrating terrestrial species using the Atlantic Flyway may follow the coastline during migration or use more direct flight routes over expanses of open water. Many marine birds also make annual migrations up and down the eastern seaboard (e.g., gannet, loon, and sea ducks), taking them directly through the northeastern region in spring and fall. This results in a complex ecosystem where the community composition shifts regularly and where temporal and geographic patterns are highly variable. The region supports large populations of birds in summer, some of which breed in the area (e.g., coastal gulls and terns). Other summer residents (e.g., shearwaters and storm-petrels) visit from the Southern Hemisphere (where they breed during the austral summer). In the fall, many of the summer residents leave the area and migrate south to warmer regions and are replaced by species that breed farther north and winter in the northeastern region of the United States.

BOEM funds scientific studies and partners with the USFWS to better understand how migratory birds use the Atlantic OCS and to refine the understanding of the risks from development to migratory species (BOEM 2020). BOEM uses information from these studies, the USFWS, and the scientific literature to

[1] As described under 50 CFR 10.12, "Take means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

avoid leasing areas with high concentrations of migratory birds that are most vulnerable to offshore wind development. In addition, BOEM's stakeholder engagement during the delineation of the adjacent MA WEA resulted in the exclusion of 14 Atlantic OCS blocks that overlapped with high value sea duck habitat (BOEM 2013). BOEM worked with the USFWS to develop standard operating conditions for commercial leases and terms and conditions of plan approval that are intended to ensure that the potential for adverse impacts on birds is minimized. The standard operating conditions have been analyzed in recent EAs, consultations for lease issuance and site assessment activities, and BOEM's recent approval of the Virginia Offshore Wind Technology Advancement Project (BOEM 2015). Some of the standard operating conditions originated from BMPs in the ROD for the 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* (MMS 2007:Section 2.7). BOEM and the USFWS will continue to work with lessees to develop postconstruction plans (e.g., those developed for the Vineyard Wind 1 final EIS (BOEM 2021a) and the SFWF final EIS (BOEM 2021b) aimed at monitoring the effectiveness of mitigative measures considered necessary to minimize impacts to migratory birds with the flexibility to consider the need for modifications or additions to the measures.

Regional Offshore and Inland Birds

The Lease Area is located within the Mid-Atlantic Bight, an oceanic region spanning Cape Cod, Massachusetts, to Cape Hatteras, North Carolina. A broad group of bird species may pass through the Lease Area and surrounding area, including migrants (e.g., raptors and songbirds), coastal birds (e.g., shorebirds, waterfowl, and waders), and marine birds (e.g., seabirds and sea ducks). See Table 3-1 in COP Appendix AA for a list of species that may pass through the Lease Area (bri 2021). A high diversity of marine birds uses the Lease Area because it is located at the northern end of the Mid-Atlantic Bight, which overlaps northern and southern species assemblages (bri 2021). Avian surveys were conducted within the Rhode Island Ocean Special Area Management Plan (OSAMP) study area, which included approximately 1,467 square miles (3,800 square kilometers [km^2]) with areas of the Block Island Sound, Rhode Island Sound, and the Atlantic continental shelf (Winiarski et al. 2012). Several methods were used to quantify the distributions and abundances of birds in the OSAMP study area, including land-based surveys, boat-based surveys, and aerial surveys. Survey data show that the use of these waters by coastal and marine birds is heaviest during winter months, peaking in early March to mid-April as birds prepare for and begin their spring migration. In general, coastal waters of less than 65.5 feet (20 m) in depth are important foraging habitat for diving ducks in winter, and nearshore shallow waters are important foraging habitat for locally breeding terns during summer months. Passerines use the air space during migration periods, and Block Island is an important stopover and resting spot for many species. Figures 3-7, 3-10, 3-12, and 3-13 in the Project's COP (bri 2021:Appendix AA) depict shorebirds; herons and egrets; songbirds; and coastal ducks, geese, swans, and grebes observed by season during OSAMP surveys, respectively.

The Marine-life Data and Analysis Team (MDAT) bird models (Curtice et al. 2019; Winship et al. 2018) describe regional-scale patterns of abundance with a range of environmental variables to produce long-term average annual and seasonal models. The MDAT Version 2 relative abundance and distribution models were produced for 47 bird species using U.S. Atlantic waters from Florida to Maine and thus provide an excellent regional context for local relative densities estimated from OSAMP surveys (see Part IV of COP Appendix AA) (bri 2021). Overall, the MDAT models indicate avian abundance is greater closer to shore than in the Lease Area (see Figure 3-6 in COP Appendix AA) (bri 2021).

A variety of passerines and other birds migrate along the Atlantic coast and could fly over the onshore facilities' locations. Although most of the U.S. coastline is disturbed from previous anthropogenic uses, there are several different key habitats present that are suitable to a range of wildlife species. Bird species observed during field investigations and a list of birds that could occur based on habitat preferences within the GAA are listed in Tables C-1 through C-3 in Appendix C in COP Appendix K (vhb 2021).

Overall, birds in the northeastern United States are subject to pressure from ongoing activities, particularly accidental releases of fuel/fluids/hazardous materials (hazmat), sediment, and/or trash and debris; new cable emplacement; interactions with fisheries and fishing gear; and climate change. More than one-third of bird species that occur in North America (37%, 432 species) are at risk of extinction unless significant conservation actions are taken (North American Bird Conservation Initiative [NABCI] 2016). This is likely representative of the conditions of birds within the GAA. The northeastern United States is also home to more than one-third of the human population of the nation. As a result, species that live or migrate through the Atlantic Flyway have historically been, and will continue to be, subject to a variety of ongoing anthropogenic stressors, including hunting pressure (approximately 86,000 sea ducks harvested annually [Roberts 2019]), commercial fisheries bycatch (approximately 2,600 seabirds killed annually on the Atlantic [Hatch 2017; Sigourney et al. 2019]), and climate change, all of which have the potential to adversely impact bird species. According to the NABCI, more than half of the offshore bird species (57%, 31 species) have been placed on the NABCI watch list because of their small ranges, small and declining populations, and threats to required habitats (NABCI 2016). Globally, monitored offshore bird populations have declined by nearly 70% from 1950 to 2010, which may be representative of the overall population trend of seabirds (Paleczny et al. 2015) that may forage, breed, and migrate over the Atlantic OCS. Overall, offshore bird populations are decreasing, although considerable differences in population trajectories of offshore bird families have been documented (NABCI 2016).

Coastal birds, especially those that nest in coastal marshes and other low-elevation habitats, are vulnerable to the rising sea level and the increasing frequency of strong storms due to global warming. According to the NABCI, nearly 40% of the more than 100 bird species that rely on coastal habitats for breeding or migration are on the NABCI watch list. Many of these coastal species have small population sizes and/or restricted distributions, resulting in an increased vulnerability to habitat loss/degradation and other stressors (NABCI 2016). These ongoing impacts on birds would continue regardless of the offshore wind industry. Some of the main drivers of bird population declines include habitat loss, habitat fragmentation, collisions with glass windows and power lines, invasive species, predators, toxic chemicals, and climate change (Mass Audubon 2011, 2013, 2017).

Avian exposure assessments for the Project were conducted for species-season combinations using MDAT and/or OSAMP data (bri 2021). To assess bird exposure at the local (i.e., MI/RI WEA) and regional scales (i.e., U.S. Atlantic waters), the Lease Area was compared to other similarly sized areas in each dataset for each season and species. Estimated exposure for each season and species was given a final score (see Table 3-4 in bri [2021]), which was categorized as minimal (a combined score of 0), low (combined score of 1–2), medium (combined score of 3–4), or high (combined score of 5–6). The exposure scores for each species and season, as well as the aggregated scores (e.g., the annual scores for each species and taxonomic group), should be interpreted as a measure of the relative importance of the Lease Area for a species/group, as compared to other surveyed areas in the region and in the northwest Atlantic. Qualitative exposure determinations were developed using the quantitative assessment of

exposure (described above), other locally available data, existing literature, and species accounts. Maps showing the results of the exposure assessment can be found in Part VI of COP Appendix AA (bri 2021).

The Lease Area is generally far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species. Coastal birds that may forage in the Lease Area occasionally, visit the area sporadically, or pass through on their spring and/or fall migrations include shorebirds (e.g., sandpipers, plovers), waterbirds (e.g., cormorants, grebes), waterfowl (e.g., scoters, mergansers), wading birds (e.g., herons, egrets), raptors (e.g., falcons, eagles), and songbirds (e.g., warblers, sparrows). Overall, except for migratory falcons and songbirds, coastal birds are considered to have minimal exposure to the Lease Area. Falcons, primarily peregrine falcons (*Falco peregrinus*), may be exposed to the Lease Area. Of the marine birds, loons, sea ducks, gulls, terns, and auks received up to a medium overall exposure assessment. Some migratory songbirds, particularly blackpoll warblers (*Setophaga striata*), may also be exposed to the Lease Area during fall migration (bri 2021).

Special-Status Species

Three bird species listed under the ESA are present in the region: piping plover (*Charadrius melodus*) (threatened), red knot (*Calidris canutus rufa*) (threatened), and roseate tern (*Sterna dougallii*) (endangered). The Atlantic population of piping plover nests on beaches in the northeastern U.S. coastal region and will also migrate (spring and fall) through the Lease Area to and from breeding sites. Red knots winter in southern states or in Central or South America and may pass through the Lease Area during migration (spring and fall) in transit to and from Arctic breeding sites. Roseate terns also migrate through the Lease Area in the spring and fall on their way to and from breeding sites in New York, the New England states, and Atlantic Canada. BOEM has prepared a BA to address Project effects to federally listed species under the jurisdiction of the USFWS, pursuant to Section 7 of the ESA (BOEM 2022). The BA also provides detailed accounts for each of these species.

To assess if any special-status species have the potential to occur in the onshore portion of the Lease Area, information from the Rhode Island Department of Environmental Management (DEM) Environmental Resource Map (ERM) was evaluated and an official species list from the USFWS IPaC tool was generated on September 28, 2019, regarding the landfall envelope, the onshore transmission cable routes, the OnSS, and the interconnection cable route (vhb 2021). vhb utilized the IPaC tool to generate lists of bird species protected under the MBTA that have been designated as Birds of Conservation Concern (BCC) by the USFWS within the proposed limits of the onshore facilities during development of the *Onshore Natural Resources and Biological Assessment* (vhb 2021). BCC are those species that without additional conservation actions are likely to become candidates for listing under the ESA (USFWS 2021). Table 4 in Appendix K of the COP (vhb 2021) provides the list of BCC with the potential to occur within the limits of the onshore facilities and indicates which of these species were observed during field investigations. According to the Rhode Island DEM ERM, there are no records of state-listed species within the GAA (vhb 2021). Migratory bird species with potential to occur near proposed onshore facilities are also presented in Table 4 of COP Appendix K (vhb 2021).

Bald and Golden Eagles

Eagles have additional federal protection (besides under the MBTA) under the Bald and Golden Eagle Protection Act. The general morphology of both bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) dissuades long-distance movements in offshore settings (Kerlinger 1985).

These two species generally rely upon thermal formation, which develops poorly over the open ocean, during long-distance movements. The bald eagle is present year-round in Massachusetts and Rhode Island, and its numbers have been slowly increasing over approximately the last 30 years. They are rarely observed in offshore surveys (Williams et al. 2015; all observations < 3.7 miles [6 km] from shore), which supports the notion that bald eagles do not venture far from land. Although bald eagles could be present near the proposed onshore facilities and would most likely be present in late April, no bald eagles were observed during field investigations (vhb 2021). Bald and golden eagles are not expected to occur within the Lease Area, but some potential exists for effects (e.g., displacement due to noise, habitat loss/modification, and injury/mortality due to contact with construction equipment) resulting from the construction and installation, O&M, and decommissioning of the onshore facilities.

3.7.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential bird impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: Future offshore wind and non-wind activities could expose coastal offshore waters to contaminants (e.g., fuel, sewage, solid waste, or chemicals, solvents, oils, or grease from equipment) in the event of a spill or release during routine vessel use. Ingestion of hard and soft plastic debris could lead to blockages and could result in adverse health effects to birds, such as decreased hematological function, dehydration, drowning, hypothermia, starvation, weight loss, and even death (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare. Spills could result in small exposures that cause oiling of feathers that can lead to adverse effects such as changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities (Maggini et al. 2017). All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. WTGs and OSSs are generally self-contained and would not generate discharge (see COP Appendix D). Vessels would also have onboard containment measures that would further reduce the impact of a spill in the event of an allision or collision. Based on the low risk of spills from vessels due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a **negligible** adverse impact to birds.

Anchoring and new cable emplacement/maintenance: A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur primarily in previously disturbed areas. Up to 23,745 acres of localized temporary seafloor disturbance and associated increased suspended sedimentation could occur during construction of proposed wind farm cables (see Table E-4 in Appendix E). Where future offshore wind activities overlap the GAA, there would be increased anchoring of vessels during survey activities and during the construction and installation, O&M, and decommissioning of offshore components. In addition, there could be increased anchoring/mooring of meteorological (met) towers or buoys. Disturbed seafloor from construction of future offshore wind projects and anchoring may affect diving birds'

foraging success or may affect some prey species (e.g., benthic assemblages); however, impacts would be temporary and localized, and birds would be able to successfully forage in adjacent areas and would not be affected by increased suspended sediments and no population-level impacts would occur. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability for this location. Therefore, adverse impacts would be **minor**. See Sections 3.6 and 3.13 for detailed information on potential effects to benthic habitat.

Climate change: Impacts associated with climate change (i.e., increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, habitat conversion, and increased erosion and sediment deposition) could result in long-term **minor** adverse risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing. During construction, future offshore wind development activities may result in a small temporary increase in greenhouse gas (GHG) emissions (see Section 3.4.2.2.2). However, operation of these projects may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources.

Light: Nighttime lighting associated with offshore structures and vessels could also represent a source of bird attraction. Under the No Action Alternative, offshore WTGs and OSSs would have hazard and aviation lighting that would be added beginning in 2021 and continuing through 2027 (see Table E1-3 in Appendix E1). Construction vessels are also a source of artificial lighting. Vessel lighting would be temporary and result in a **minor** adverse impact to birds; structure lighting may pose an increased collision or predation risk (Hüppop et al. 2006), although this risk would be localized in extent and minimized using BOEM lighting guidelines (BOEM 2021c; Kerlinger et al. 2010), and therefore would also be a **minor** adverse impact.

Noise: Table E-3 in Appendix E indicates that multiple offshore wind project construction periods are anticipated between 2022 and 2027. Construction noise sources will include, most notably, pile driving as well as geological and geophysical surveys, offshore and onshore construction, and aircraft and vessel traffic. These would create noise and may temporarily impact some bird species by displacing them and changing their behavior. Noise generated by construction equipment also has the potential to mask signals used by certain bird species for communication and mating, as well as hunting, which can lead to a decrease in bird density in the affected area (Bottalico et al. 2015). Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. Noise transmitted through water could temporarily displace diving birds in a limited space around each pile and could cause short-term stress and behavioral changes ranging from mild annoyance to escape behavior (BOEM 2014b, 2016). Vessel and aircraft noise could also disturb some individual diving birds, but they would acclimate to the noise or move away, potentially resulting in temporary displacement. Collectively, these noise sources would be temporary and localized, resulting in a **minor** adverse impact to these birds.

Presence of structures: Onshore land development or port expansion activities could result in limited loss of nesting and/or foraging habitat for some bird species. The presence of offshore structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and the associated increase in foraging opportunities as well as entanglement and gear loss/damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, met towers, foundations, scour/cable protections, and transmission cable infrastructure.

The primary threat to birds from the presence of structures would be from collision with WTGs. Birds are susceptible to collision with structures, particularly at night and/or during other periods of low visibility (e.g., rain or fog) (Stantec 2018). As discussed above, the Atlantic Flyway is an important migratory pathway for up to 164 species of waterbirds, and a similar number of land birds, with the greatest volume of birds using the Atlantic Flyway during annual migrations between wintering and breeding grounds (Watts 2010). As discussed in BOEM (2012), 55 bird species could encounter operating WTGs on the Atlantic OCS. However, the abundance of birds that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (Curtice et al. 2019; Winship et al. 2018). Of 55 bird species, 47 have sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0% to 5.2% (Table 3.7-1). BOEM assumes that the 47 species (85%) with sufficient data to model the relative distribution and abundance are representative of the 55 species that may overlap offshore wind development on the Atlantic OCS.

Table 3.7-1. Percentage of Atlantic Seabird Populations that Overlap with Anticipated Offshore Wind Energy Development on the Outer Continental Shelf by Season

Species	Spring	Summer	Fall	Winter
Artic tern (*Sterna paradisaea*)	N/A	0.2%	N/A	N/A
Atlantic puffin (*Fratercula arctica*)	0.2%	0.1%	0.1%	0.2%
Audubon shearwater (*Puffinus lherminieri*)	0.0%	0.0%	0.0%	0.0%
Black-capped petrel (*Pterodroma hasitata*)	0.0%	0.0%	0.0%	0.0%
Black guillemot (*Cepphus grille*)	N/A	0.3%	N/A	N/A
Black-legged kittiwake (*Rissa tridactyla*)	0.7%	N/A	0.7%	0.5%
Black scoter (*Melanitta americana*)	0.2%	N/A	0.4%	0.5%
Bonaparte's gull (*Chroicocephalus philadelphia*)	0.5%	N/A	0.4%	0.3%
Brown pelican (*Pelecanus occidentalis*)	0.1%	0.0%	0.0%	0.0%
Band-rumped storm-petrel (*Oceanodroma castro*)	N/A	0.0%	N/A	N/A
Bridled tern (*Onychoprion anaethetus*)	N/A	0.1%	0.1%	N/A
Common eider (*Somateria mollissima*)	0.3%	0.1%	0.5%	0.6%
Common loon (*Gavia immer*)	3.9%	1.0%	1.3%	2.1%
Common murre (*Uria aalge*)	0.4%	N/A	N/A	1.9%
Common tern (*Sterna hirundo*)	2.1%	3.0%	0.5%	N/A
Cory's shearwater (*Calonectris borealis*)	0.1%	0.9%	0.3%	N/A
Double-crested cormorant (*Phalacrocorax auritus*)	0.7%	0.6%	0.5%	0.4%
Dovekie (*Alle alle*)	0.1%	0.1%	0.3%	0.2%
Great black-backed gull (*Larus marinus*)	1.3%	0.5%	0.7%	0.6%

Species	Spring	Summer	Fall	Winter
Great shearwater (*Puffinus gravis*)	0.1%	0.3%	0.3%	0.1%
Great skua (*Stercorarius skua*)	N/A	N/A	0.1%	N/A
Herring gull (*Larus argentatus*)	1.0%	1.3%	0.9%	0.5%
Horned grebe (*Podiceps auritus*)	N/A	N/A	N/A	0.3%
Laughing gull (*Leucophaeus atricilla*)	1.0%	3.6%	0.9%	0.1%
Leach's storm-petrel (*Oceanodroma leucorhoa*)	0.1%	0.0%	0.0%	N/A
Least tern (*Sternula antillarum*)	N/A	0.3%	0.0%	N/A
Long-tailed duck (*Clangula hyemalis*)	0.6%	0.0%	0.4%	0.5%
Manx shearwater (*Puffinus puffinus*)	0.0%	0.5%	0.1%	N/A
Northern fulmar (*Fulmarus glacialis*)	0.1%	0.2%	0.1%	0.2%
Northern gannet (*Morus bassanus*)	1.5%	0.4%	1.4%	1.4%
Parasitic jaeger (*Stercorarius parasiticus*)	0.4%	0.5%	0.4%	N/A
Pomarine jaeger (*Stercorarius pomarinus*)	0.1%	0.3%	0.2%	N/A
Razorbill (*Alca torda*)	5.2%	0.2%	0.4%	2.1%
Ring-billed gull (*Larus delawarensis*)	0.5%	0.5%	0.9%	0.5%
Red-breasted merganser (*Mergus serrator*)	0.5%	N/A	N/A	0.7%
Red phalarope (*Phalaropus fulicarius*)	0.4%	0.4%	0.2%	N/A
Red-necked phalarope (*Phalaropus lobatus*)	0.3%	0.3%	0.2%	N/A
Roseate tern (*Sterna* dougallii)	0.6%	0.0%	0.5%	N/A
Royal tern (*Thalasseus maximus*)	0.0%	0.2%	0.1%	N/A
Red-throated loon (*Gavia stellate*)	1.6%	N/A	0.5%	1.0%
Sooty shearwater (*Ardenna grisea*)	0.3%	0.4%	0.2%	N/A
Sooty tern (*Onychoprion fuscatus*)	0.0%	0.0%	N/A	N/A
South polar skua (*Stercorarius maccormicki*)	N/A	0.2%	0.1%	N/A
Surf scoter (*Melanitta perspicillata*)	1.2%	N/A	0.4%	0.5%
Thick-billed murre (*Uria lomvia*)	0.1%	N/A	N/A	0.1%
Wilson's storm-petrel (*Oceanites oceanicus*)	0.2%	0.9%	0.2%	N/A
White-winged scoter (*Melanitta deglandi*)	0.7%	N/A	0.2%	1.3%

Source: Calculated from Winship et al. (2018).

Notes: N/A = not applicable.

The primary operational impact to bird resources would be collision with turbines. In the contiguous United States, bird collisions with operating WTGs are believed to be a relatively rare event, with an estimated 140,000 to 328,000 (mean = 234,000) birds killed annually by 44,577 onshore turbines (Loss et al. 2013). Robinson Willmott et al. (2013) evaluated the sensitivity of bird resources to collision and/or

displacement due to future wind development on the Atlantic OCS and included the 164 species selected by Watts (2010) plus an additional 13 species, for a total of 177 species that may occur on the Atlantic OCS from Maine to Florida during all or some portion of the year. As discussed in Robinson Willmott et al. (2013), species populations with high scores for sensitivity for collision include gulls, jaegers, and the northern gannet (*Morus bassanus*). In many cases, high collision sensitivity was driven by high occurrence on the Atlantic OCS, low avoidance rates with high uncertainty, and time spent in the RSZ. Many of the species addressed in Robinson Willmott et al. (2013) that had low collision sensitivity include migrating passerines that typically fly above the RSZ. As discussed in BOEM (2012), 55 species may be expected to have some level of potential overlap with the WEA and could encounter operating WTGs on the Atlantic OCS. However, generally the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small. As described above, of the 177 species that may occur along the Atlantic coast, 55 are likely to encounter WTGs associated with offshore wind development. Of these, there are a total of 47 marine bird species with sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0% to 5.2% (see Table 3.7-1). BOEM assumes that the 47 species (85%) with sufficient data to model the relative distribution and abundance on the Atlantic OCS are representative of the 55 species that may overlap with offshore wind development on the Atlantic OCS.

Additionally, with the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, only a small percentage of bird species migrating over the Atlantic OCS would encounter WTGs, with most flying above or below spinning turbines. Further, the spacing between turbines would likely permit birds to fly through individual lease areas without changing course or only making minor course corrections to avoid operating WTGs. Course corrections made to avoid a wind energy facility could result in exposure to one or more additional wind energy facilities within the GAA, but again, the 1-nm spacing would allow for migrating individuals to make only small course correction, if any, to avoid operating WTGs. Course corrections made by migratory birds to avoid a project or individual WTG would be relatively minor when compared to the distances traveled during seasonal long-distance migrations. Adverse impacts of additional energy expenditure due to minor course corrections or complete avoidance of lease areas would not be expected to be biologically significant, and no population-level effects would be expected. Therefore, these adverse impacts would be **minor**.

The addition of WTGs to the offshore environment could result in increased functional loss of habitat for those bird species with higher displacement sensitivity. However, substantial foraging habitat for resident birds would remain available. Further, a recent study of long-term data collected in the North Sea found that despite the extensive observed displacement of loons in response to the development of 20 wind farms, there was no decline in the region's loon population (Vilela et al. 2021).

The presence of new structures could result in increased prey items for some marine bird species. WTG foundations could increase the mixing of surface waters and deepen the thermocline, possibly increasing pelagic productivity in local areas (English et al. 2017). The new structures may also create habitat for structure-oriented and/or hard-bottom species. This reef effect has been observed around WTGs, leading to local increases in biomass and diversity (Causon and Gill 2018). Invertebrate and fish assemblages may

develop around these reef-like elements within the first year or two after construction (English et al. 2017). Although some studies have noted increased biomass and increased production of particulate organic matter by epifauna growing on submerged foundations, it is not clear to what extent the reef effect results in increased productivity versus simply attracting and aggregating fish from the surrounding areas (Causon and Gill 2018). Recent studies have found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, marine mammals, and birds as well (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), indicating that offshore wind energy facilities can generate beneficial permanent impacts on local ecosystems, translating to increased foraging opportunities for individuals of some marine bird species. BOEM anticipates that the presence of structures may result in permanent beneficial impacts. Conversely, increased foraging opportunities could attract marine birds, potentially exposing those individuals to increased collision risk associated with operating WTGs. Therefore, these impacts would be **minor** adverse.

3.7.1.2 Conclusions

Under the No Action Alternative, birds would continue to follow the current general trends and respond to current and future environmental and societal activities. Although the Project would not be built as proposed under the No Action Alternative, ongoing activities (e.g., commercial fisheries) and future offshore wind development would continue to have temporary to permanent adverse impacts (e.g., disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds primarily through accidental releases, anthropogenic noise, traffic, presence of structures, and climate change. In addition to ongoing activities, the impacts of planned actions other than offshore wind development, including new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and the installation of new structures on the Atlantic OCS, would be **minor** adverse. The combination of ongoing activities and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts on birds in the GAA.

Considering all the IPFs together, the overall impacts associated with offshore wind activities in the GAA would result in **minor** adverse impacts to birds. Most of the offshore structures in the GAA would be attributable to offshore wind development. Migratory birds that use the offshore WEAs during all or parts of the year would either be exposed to new collision risk or would have long-term functional habitat loss due to behavioral avoidance and displacement from WEAs on the Atlantic OCS. The offshore wind development would also be responsible for most of the impacts related to new cable emplacement and pile-driving noise, but impacts on birds resulting from these IPFs would be localized and temporary and would not be biologically significant.

The No Action Alternative would forgo postconstruction avian monitoring for migratory birds and ESA-listed species and annual mortality reporting, the results of which could contribute to an improved understanding of the effects of offshore wind development, benefit the future management of these species, and inform planning of other offshore development. However, ongoing and future surveys and monitoring could still supply similar data.

3.7.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on bats include the number, size, and location of WTGs; the location of the OnSS and ICF; the type of lighting to be used; the location of construction within the landfall work area and within the transmission cable envelope; and the time of year during which construction occurs. Impacts associated with construction of onshore elements of the Proposed Action during the breeding season for birds could be avoided if onshore construction occurs outside of this time frame.

The following EPMs would be implemented to minimize potential impacts to birds:

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
- The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for birds across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E1-3 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.7-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations.

The overall impact to birds from any action alternative would be **minor** adverse, as the effects would be small, and the resource would recover completely, with no mitigating action required.

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Table 3.7-2. Alternative Comparison Summary for Birds

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	Future offshore wind and non-wind activities could expose coastal offshore waters to contaminants (e.g., fuel, sewage, solid waste, or chemicals, solvents, oils, or grease from equipment) in the event of a spill or release during routine vessel use. Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. Based on the low risk of spills from vessels due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a **negligible** adverse impact to birds.	**Offshore**: Potential adverse impacts to birds from contaminant discharges or releases or from improper disposal of trash or debris during construction would be avoided or minimized with adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes, resulting in short-term **negligible** to **minor** adverse impacts. Accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time; for this reason, BOEM expects localized and temporary **negligible** adverse impacts on birds. Impacts to birds from this IPF during operation and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in short-term **negligible** to **minor** adverse impacts with compliance with USCG requirements and BSEE regulations. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be likely limited in extent and duration and would result in localized and temporary **negligible** adverse cumulative impacts on birds.	**Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required, thereby resulting in a negligible decreased risk for accidental releases and discharges. However, no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated, which are expected to be localized and temporary **negligible** to **minor** adverse. Impacts to birds from this IPF during operation and decommissioning of the offshore facilities are expected to be similar to offshore construction impacts, and no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated, which are expected to be **negligible** to **minor** adverse. Future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazmat exposure. The contribution from future offshore wind and Alternatives C through F would be a low and non-measurable percentage of the overall spill risk from ongoing activities. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including Alternatives C through F, would be likely limited in extent and duration of a release and result in localized and temporary **negligible** adverse cumulative impacts to birds.			
		Onshore: Onshore, construction and HDD activities could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. Based on the low risk of spills due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a localized and temporary **negligible** adverse impact to birds. The OnSS would require various oils, fuels, and lubricants to support its operation. Accidental discharges, releases, and disposal could indirectly cause bird habitat degradation; however, risks would be avoided through spill prevention and control measures and associated BMPs. Therefore, potential adverse impacts associated with discharges and releases are considered short term and localized **negligible** adverse. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of a release and result in **negligible** adverse cumulative impacts to birds.	**Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to short term **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Anchoring and new cable emplacement/ maintenance	A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 6 to 10 years to tie future offshore wind energy projects to the electric grid. Typically, this would require only small amounts of habitat removal, if any, and would occur primarily in previously disturbed areas. Where future offshore wind activities overlap the GAA, there would be increased anchoring of vessels during survey activities and during the construction and installation, O&M, and decommissioning of offshore components. Disturbed seafloor from construction of future offshore wind projects and anchoring may affect diving birds' foraging success or may affect some prey species (e.g., benthic assemblages); however, impacts would be temporary and localized, and birds would be able to successfully forage in adjacent areas and would not be affected by increased suspended sediments and no population-level impacts would occur. Therefore, adverse impacts would be **minor**.	**Offshore**: Seafloor disturbed by cable installation and dredging prior to cable installation would result in turbidity effects that could reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species. Vessel anchoring during construction would also result in increased turbidity. Individual birds would successfully forage in nearby areas not affected by increased turbidity/sedimentation during anchoring and cable emplacement, and only nonmeasurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of construction activities. Other than temporary increases in turbidity from seafloor disturbance due to occasional vessel anchoring, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse. In the context of reasonably foreseeable environmental trends, the combined cable emplacement impacts from ongoing and planned actions, including the Proposed Action, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be **negligible** and would not be biologically significant. For these reasons, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** cumulative adverse impacts to birds.	**Offshore**: Alternatives C through F would reduce the number of WTG foundations and IACs. Reduced habitat disturbance from foundation and IAC installation could negligibly decrease turbidity that could alter the behavior of bird species. Therefore, BOEM would expect a similar but lower impact to birds than the Proposed Action: temporary, lasting up to 12 hours, localized and nonmeasurable **negligible** adverse impacts. Similar to the Proposed Action, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse. Alternatives C through F would add 5,864 to 6,665 acres of seafloor disturbance from operation of WTG foundations and scour protection, the RWEC and IAC installation, and anchoring to the No Action Alternative, which represents up to 28% of the total seafloor disturbance estimated under the No Action Alternative. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased turbidity, and only nonmeasurable negligible impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. In the context of reasonably foreseeable environmental trends, the combined cable emplacement and anchoring impacts from ongoing and planned actions, including Alternatives C through F, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be negligible and would not be biologically significant. For these reasons, these alternatives in combination with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** adverse cumulative impacts to birds.			
		Onshore: Land disturbance and habitat alteration resulting from construction within the landfall work area may result in the direct injury or mortality of bird species. Mitigations like observing time-of-year restrictions on vegetation removal would avoid the breeding season of birds, thus reducing the likelihood of injury and/or mortality from construction activities. Therefore, the impacts (e.g., injury and/or mortality) resulting from land disturbance and habitat alteration would be temporary **negligible** adverse. Additionally, construction work within the landfall work area would occur largely outside of the breeding period of listed species that might nest in the area, and because use of the shoreline by shorebirds within the landfall work area has not been documented (vhb 2021), onshore impacts for listed species from land disturbance would also be **negligible** adverse. Onshore transmission cable installation would also result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat. Operation of the onshore transmission cable would pose no risk to birds because it would be buried. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the perimeters of the onshore facilities. Land disturbance as it relates to vegetation clearing may	**Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		result in the direct injury or mortality of birds. However, mortality and injury impacts would be mitigated by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bird species. Therefore, the adverse impacts resulting from this IPF would be **negligible**. The contribution of the Proposed Action on adverse cumulative impacts to birds from new cable emplacement or maintenance in the context of reasonably foreseeable onshore environmental trends within the GAA is expected to be **negligible** adverse.				
Climate change	Impacts associated with climate change (i.e., increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, habitat conversion, and increased erosion and sediment deposition) could result in long-term **minor** adverse risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing. However, future offshore wind development activities may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources.	**Offshore**: Construction of the offshore facilities would result in a small temporary increase in GHG emissions within the GAA during the construction phase. As a result, adverse impacts to birds from construction of the Proposed Action associated with climate change would be short term **negligible** adverse. The expected impacts on climate change from operation of the offshore facilities alone would not result in a measurable increase in the adverse impacts to birds beyond those described under the No Action Alternative. In addition, operation of the Proposed Action could also contribute to a long-term net decrease in GHG emissions, but this change would likely not be measurable. Therefore, BOEM expects the impacts from the Proposed Action on climate change would be long term **negligible**. The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected.	**Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced number of GHG-emitting construction vessels and/or aircraft. However, no measurable change from Proposed Action construction impacts to birds from this IPF is anticipated, which are expected to be short term **negligible** adverse. Likewise, no measurable change from Proposed Action operational impacts to birds is anticipated, which are expected to be long term **negligible** adverse. The types of impacts from global climate change described for the No Action Alternative would occur under Alternatives C through F. However, Alternatives C through F could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected.			
		Onshore: Onshore impacts to birds associated with climate change from construction and decommissioning of the Proposed Action would be similar to those discussed above for offshore facilities and activities: short term **negligible** adverse. No measurable climate change impacts to birds from O&M of the onshore facilities are expected. Therefore, the adverse impacts from this IPF are expected to be long term **negligible** adverse. The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. Therefore, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action and cumulative impacts, are expected to be long term **minor** adverse.	**Onshore**: The Habitat Alternative would not alter impacts to onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: short term to long-term **negligible** adverse. Cumulative impacts would also be the same as those described for the Proposed Action: long term **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Light	Nighttime lighting associated with offshore structures and vessels could represent a source of bird attraction. Vessel lighting would be temporary and result in a **minor** adverse impact to birds; structure lighting may pose an increased collision or predation risk (Hüppop et al. 2006), although this risk would be localized in extent and minimized using BOEM lighting guidelines (BOEM 2021c; Kerlinger et al. 2010), and therefore would also be a **minor** adverse impact.	**Offshore**: Lighting used during construction would be limited to the minimum required for safety during construction activities to minimize potential impacts. Therefore, adverse impacts to birds from lighting during construction would be localized and temporary **negligible** to **minor** adverse. Under the Proposed Action, up to 100 WTGs and up to two OSSs would be lit with USCG navigational and FAA hazard lighting. These lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). However, the mandatory use of red flashing aviation obstruction lights and the avoidance of any steady-burning aviation obstruction lights are expected to minimize bird attraction and therefore collision risk (Kerlinger et al. 2010; Orr et al. 2016). For this reason, BOEM expects adverse impacts, if any, to be long term **negligible** adverse from offshore lighting. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to birds, and no individual or population-level impacts would be expected.	**Offshore**: Although the number and duration of construction vessels and work areas requiring nighttime lighting could be slightly reduced under Alternatives C through F, no measurable change from Proposed Action construction impacts to birds is anticipated, which are expected to be localized and temporary **negligible** to **minor** adverse. Alternatives C through F would reduce nighttime lighting, thereby negligibly decreasing the risk of avian injury or mortality from collision with WTGs as compared to the Proposed Action, and impacts are expected to be long term **negligible** adverse. Alternatives C through F would add 56 to 93 new WTGs with red flashing aviation hazard lighting to the No Action Alternative; these lights could attract birds and result in increased collision risk (Hüppop et al. 2006). Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from wind farm areas. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** cumulative adverse impacts to birds because no individual or population-level impacts would be expected.			
		Onshore: Most of the onshore construction would occur during the daylight hours, although some overnight lighting may occasionally be necessary during construction of the onshore facilities. However, this is not expected to have a measurable effect on bird behavior, therefore BOEM anticipates temporary **negligible** adverse impacts to birds. During the O&M of the OnSS and ICF, yard lighting would be used for assessment of equipment. Most decommissioning activities would occur during the day, and overnight lighting would only be necessary if there is work in progress on-site or lights are left on for safety and security purposes. Therefore, the adverse impacts resulting from this IPF would be long term **negligible**. Ongoing and future onshore activities could contribute to impacts to birds from light if they occur at the same time within the GAA. However, these effects are also expected to be localized and temporary and would not contribute to adverse cumulative impacts to birds in the GAA.	**Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, construction and operational impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** adverse. Cumulative impacts would also be the same as those described for the Proposed Action: localized and temporary **negligible** to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Noise	Multiple offshore wind project construction periods are anticipated between 2022 and 2027. Construction noise sources will include, most notably, pile driving as well as geological and geophysical surveys, offshore and onshore construction, and aircraft and vessel traffic. These would create noise and may temporarily impact some bird species by displacing them and changing their behavior. Vessel and aircraft noise could also disturb some individual diving birds, but they would acclimate to the noise or move away, potentially resulting in temporary displacement. Collectively, these noise sources would be temporary and localized, resulting in a **minor** adverse impact to these birds.	**Offshore**: **Negligible** to **minor** adverse impacts to birds would occur from construction noise related to pile driving as well as geological and geophysical surveys and aircraft and vessel traffic. These activities could flush birds in the path of vessels, causing temporary displacement from the area. Impacts to birds from operational noise and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in **negligible** adverse impacts. Pile driving and other construction noise and activity associated with the Proposed Action could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative impacts to birds.	**Offshore**: Alternatives C through F would slightly decrease noise associated with pile driving for WTGs and other construction-related noise as compared to the Proposed Action, which are short-term **negligible** to **minor** adverse impacts. No measurable change from Proposed Action O&M impacts is anticipated because operational noise sources and levels would be the same: long-term **negligible** adverse impacts. Pile driving and other construction noise and activity associated with Alternatives C through F could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, Alternatives C through F's contribution would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird's ability to survive and reproduce) or population-level effects would be expected. Therefore, these alternatives when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** cumulative adverse impacts to birds.			
		Onshore: Noise from traffic associated with construction and vegetation removal within the landfall work area and other onshore facilities could affect shorebirds, some seabirds, and land birds that use the terrestrial habitats in the immediate vicinity of construction activities through displacement or avoidance behavior of individuals and/or disruptions in communication, mating, and hunting. The impacts associated with construction would be similar to existing sources of noise and traffic in the local area and therefore are considered a temporary **negligible** adverse impact. Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to birds adjacent to the OnSS. However, such disturbance would be short term, and normal avian activity would likely resume after the traffic ceases. BOEM expects these adverse impacts to be **negligible**. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of noise and would result in **negligible** adverse cumulative impacts to birds.	**Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	Onshore land development or port expansion activities could result in limited loss of nesting and/or foraging habitat for some bird species. The presence of offshore structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and the associated increase in foraging opportunities as well as entanglement and gear loss/damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, met towers, foundations, scour/cable protections, and transmission cable infrastructure. Therefore, these impacts would be **minor** adverse.	**Offshore**: The various types of impacts on birds that could result from the presence of structures during construction include fish aggregation and an associated increase in foraging opportunities as well as entanglement and fishing gear loss/damage, migration disturbances, and displacement. These impacts would be temporary, and BOEM expects them to be **negligible** adverse. **Negligible** to **minor** temporary adverse impacts from bird collisions with visible structures could occur during construction, depending on the species and number of individuals involved. The presence and operation of the offshore facilities may result in displacement of waterbirds, waterfowl, seabirds, and phalaropes that use the area for foraging, resting, or nighttime roosting. Long-term adverse impacts would be **negligible** to **minor**, depending on whether birds are at high risk for displacement or are able to access preferred habitat, and these impacts may change over time if birds become habituated to the presence of the WTGs and OSSs. Impacts to birds from decommissioning of the RWF and offshore RWEC would be similar to those described for the construction phase. The Project is not expected to affect special-status species populations. Cumulative impacts on birds from the presence of structures associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial.	**Offshore**: Alternatives C through F would reduce the number of WTGs, potentially resulting in a reduced amount of offshore construction equipment and vessels required. However, because bird exposure to vessels and installation infrastructure would be temporally limited to the construction period, the behavioral vulnerability to collision with construction equipment under Alternatives C through F is expected to be the same as described for the Proposed Action, which are **negligible** to **minor** temporary adverse impacts. During operations, Alternatives C through F would reduce the number of WTGs, potentially allowing for improved maneuverability for birds through the Lease Area and negligibly decreasing the risk of injury or mortality from collision with WTGs as compared to the Proposed Action, and impacts are expected to be long term **negligible** to **minor** adverse. Alternatives C through F would add 56 to 93 additional WTGs and up to two OSSs compared to the No Action Alternative. The total cumulative foundations on the Atlantic OCS would be 3,110, and the Project would account for less than 4% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and persist until decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with these alternatives when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial.			
		Onshore: Impacts from habitat alteration and land disturbance on coastal and terrestrial bird habitats generated from the construction of the onshore facilities would create habitat loss and conversion, affect bird habitat use, and possibly create habitat degradation. During the breeding season, clearing of trees or vegetation could result in destruction of nests, adversely impacting some individuals. However, lasting impacts to local breeding populations are not anticipated. Collisions between birds and vehicles or construction equipment have some limited potential to cause injury and mortality. Therefore, impacts to birds from construction of onshore facilities would be short term **negligible** to **minor** adverse. The OnSS and ICF would be visible structures that would result in permanent bird habitat conversion and loss. The OnSS access road and fenced-in property would become nonhabitat and result in habitat fragmentation. The conversion of forested cover type outside the OnSS and ICF fences would alter the structural diversity within a forested area by adding more edge habitat. Considering the adjacent landscape consists primarily of residential and commercial developments with some undisturbed areas of ruderal forested swamp, the adverse impacts to birds from the OnSS and the ICF on forested habitat fragmentation would be long term **negligible** to **minor**. The potential for avian mortality or injury due to the low risk of collision with the OnSS and related structures would be a long-term	**Onshore**: Alternatives C through F would not alter impacts to onshore activities; therefore, impacts would be the same as those described for the Proposed Action: temporary to long-term **negligible** to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
		minor adverse impact. The potential for avian avoidance behavior related to habitat conversion and loss from the OnSS would also be a long-term **minor** adverse impact. Adverse impacts to birds from habitat fragmentation related to a visible change in the landscape during decommissioning would be **negligible** because local populations would have adapted to the landscape changes. The presence of these structures when considered in the context of ongoing and planned actions within the GAA would be a very minor risk of mortality or injury to birds due to collision, and generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection. Therefore, BOEM anticipates long-term **negligible** to **minor** adverse cumulative impacts to birds.				

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3.7.2.2 Alternative B: Impacts of the Proposed Action Alternative on Birds

3.7.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: Some potential for mortality, decreased fitness, and health effects exists due to the accidental release of fuel, hazmat, and trash and debris from vessels associated with construction and installation of the Proposed Action. Vessels associated with the Proposed Action may generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris. All vessels associated with the Proposed Action would comply with USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills. Potential adverse impacts to birds from contaminant discharges or releases or from improper disposal of trash or debris during construction would be avoided or minimized with adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes, resulting in short-term **negligible** to **minor** adverse impacts. Accidental spills or releases of oils or other hazardous materials offshore would be managed through the OSRP (see COP Appendix D). Additionally, training and awareness of BMPs proposed for waste management and mitigation of marine debris would be required of Project personnel, reducing the likelihood of occurrence to a very low risk. These accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time; for this reason, BOEM expects localized and temporary **negligible** adverse impacts on birds.

Anchoring and new cable emplacement/maintenance: Construction of the WTG foundations and the installation of the submarine cables could result in short-term habitat disturbance for foraging birds. Seafloor disturbed by cable installation and dredging prior to cable installation would result in turbidity effects that could reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species. These impacts would be temporary, lasting up to 12 hours, and localized to the emplacement corridor. Vessel anchoring during construction would also result in increased turbidity. Individual birds would successfully forage in nearby areas not affected by increased turbidity/sedimentation during anchoring and cable emplacement, and only nonmeasurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of construction activities.

Climate change: Construction of the offshore facilities would result in a small temporary increase in GHG emissions within the GAA during the construction phase. However, these emissions could be reduced by staggering construction time frames and implementing applicant-proposed EPMs (see Table G-1 in Appendix G). As a result, adverse impacts to birds from construction of the Proposed Action associated with climate change would be short term **negligible** adverse.

Light: Lighting used during construction would be limited to the minimum required for safety during construction activities to minimize potential impacts. Therefore, adverse impacts to birds from lighting during construction would be localized and temporary **negligible** to **minor** adverse.

Noise: **Negligible** to **minor** adverse impacts to birds would occur from construction noise related to pile driving as well as geological and geophysical surveys and aircraft and vessel traffic. These activities could flush birds in the path of vessels, causing temporary displacement from the area. However, these impacts would be temporary and similar to baseline conditions as vessel traffic already occurs, resulting

in similar temporary displacement of birds in the GAA (Stantec 2018). These impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods.

Presence of structures: The various types of impacts on birds that could result from the presence of structures during construction include fish aggregation and an associated increase in foraging opportunities as well as entanglement and fishing gear loss/damage, migration disturbances, and displacement. These impacts would be temporary, and BOEM expects them to be **negligible** adverse. **Negligible** to **minor** temporary adverse impacts from bird collisions with visible structures could occur during construction, depending on the species and number of individuals involved.

Onshore Activities and Facilities

Accidental releases and discharges: Onshore, construction and HDD activities could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. Revolution Wind would prepare a construction SPCC plan in accordance with applicable requirements and would outline spill prevention training, plans, and steps to take to contain and clean up spills that could occur. Based on the low risk of spills due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a localized and temporary **negligible** adverse impact to birds.

Climate change: Onshore impacts to birds associated with climate change from construction of the Proposed Action would be similar to those discussed above for offshore facilities and activities: short term **negligible** adverse.

Light: Most of the onshore construction would occur during the daylight hours, although some overnight lighting may occasionally be necessary during construction of the onshore facilities. However, this is not expected to have a measurable effect on bird behavior, therefore BOEM anticipates temporary **negligible** adverse impacts to birds.

New cable emplacement/maintenance: Land disturbance and habitat alteration resulting from construction within the landfall work area may result in the direct injury or mortality of bird species. Mobile individuals would be able to temporarily vacate an area of disturbance and therefore would be less susceptible to mortality or injury compared to less mobile (pre-volant) individuals. Mitigations like observing time-of-year restrictions on vegetation removal would avoid the breeding season of birds, thus reducing the likelihood of injury and/or mortality from construction activities. Therefore, the impacts (e.g., injury and/or mortality) resulting from land disturbance and habitat alteration would be temporary **negligible** adverse. Further, HDD would be employed to make the connection between the onshore transmission cable and the landfall work area, which would limit or completely avoid impacts to the human-made shoreline and the ruderal grassland/shrubland because the onshore transmission cable would be installed under these resources. Because construction work within the landfall work area would occur largely outside of the breeding period of listed species that might nest in the area, and because use of the shoreline by shorebirds within the landfall work area has not been documented (vhb 2021), onshore impacts for listed species from land disturbance would be **negligible** adverse. A detailed impacts analysis to federally listed birds from construction activities is in the USFWS BA (BOEM 2022).

The temporary onshore construction work area for HDD operations would likely be situated within a previously developed area (e.g., an existing parking lot) and would not impact the human-made shoreline and/or the ruderal grassland/shrubland. Because the landfall work area is limited to anthropogenically

made or disturbed features of the human-made shoreline and the ruderal grassland/shrubland, the potential for land disturbance and habitat alteration to significantly affect birds is **negligible** adverse. Additional land disturbance and habitat alteration would result from the installation of the onshore transmission cable from the transition joint bays to the OnSS. The onshore transmission cable installation would result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat.

Onshore transmission cable installation would also result in temporary ground disturbance. Most of the temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat.

Noise: Noise from traffic associated with construction and vegetation removal within the landfall work area and other onshore facilities could affect shorebirds, some seabirds, and land birds that use the terrestrial habitats in the immediate vicinity of construction activities through displacement or avoidance behavior of individuals and/or disruptions in communication, mating, and hunting. Displacement and avoidance behavior are expected to only occur during construction, which would occur primarily in already developed areas where birds are habituated to these types of activities. The impacts associated with construction would be similar to existing sources of noise and traffic in the local area and therefore are considered a temporary **negligible** adverse impact.

Presence of structures: Impacts from habitat alteration and land disturbance on coastal and terrestrial bird habitats generated from the construction of the onshore facilities would create habitat loss and conversion, affect bird habitat use, and possibly create habitat degradation. The OnSS and ICF parcels include ruderal forested swamp, shrub marsh, ruderal mixed oak/white pine forest, ruderal pitch pine barren, and a landfill. Vegetation clearing and ongoing vegetation management would convert some of these cover types to permanently developed land or shrubland within the areas that would undergo vegetation maintenance. This habitat conversion may be detrimental to species reliant on forest habitat but beneficial to other species that are more suited to the newly converted habitat (e.g., passerines adapted to grassland and shrubland). The OnSS would result in a permanent loss of 3.8 acres of mixed oak/white pine forest and 0.6 acre of ruderal pitch pine barren. However, the portion of forested habitat removal would be small relative to the available forested habitat in the surrounding area. During the breeding season, clearing of trees or vegetation could result in destruction of nests, adversely impacting some individuals. However, lasting impacts to local breeding populations are not anticipated. Tree and shrub removal work would occur before May 1 and after August 15, as feasible (see COP Table ES-1), to avoid the potential disturbance of birds during the breeding season. If tree and shrub removal cannot be avoided during this season, Revolution Wind would coordinate with the appropriate agencies to determine the appropriate course of action. Visible structures (i.e., construction equipment) would be present during construction of the onshore facilities. Collisions between birds and vehicles or construction equipment have some limited potential to cause injury and mortality. However, these impacts, if any, would be temporary **negligible** adverse, as most individuals would avoid noisy construction areas (Bayne et al. 2008; Goodwin and Shriver 2010; McLaughlin and Kunc 2013). Therefore, impacts to birds from construction of onshore facilities would be short term **negligible** to **minor** adverse.

3.7.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: Impacts to birds from this IPF during operation and decommissioning of the offshore facilities are expected would be similar to offshore construction impacts and result in short-term **negligible** to **minor** adverse impacts with compliance with the USCG requirements and BSEE regulations for the prevention and control of oil and fuel spills and adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes.

Anchoring and new cable emplacement/maintenance: Other than temporary increases in turbidity from seafloor disturbance due to occasional vessel anchoring, no impacts to bird species are anticipated during the O&M phase for the offshore RWF or RWEC. Impacts from decommissioning would be similar to construction impacts unless the RWEC is abandoned in place: **negligible** adverse.

Climate change: The expected impacts on climate change from operation of the offshore facilities alone would not result in a measurable increase in the adverse impacts to birds beyond those described under the No Action Alternative. In addition, operation of the Proposed Action could also contribute to a long-term net decrease in GHG emissions and may beneficially contribute to a broader combination of actions to reduce future impacts to birds from climate change over the long term due to reduced reliance on fossil fuel–generated energy sources, but this change would likely not be measurable. Therefore, BOEM expects the impacts from the Proposed Action on climate change would be long term **negligible**.

Light: Under the Proposed Action, up to 100 WTGs and up to two OSSs would be lit with USCG navigational and FAA hazard lighting. These lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). However, the mandatory use of red flashing aviation obstruction lights and the avoidance of any steady-burning aviation obstruction lights are expected to minimize bird attraction and therefore collision risk (Kerlinger et al. 2010; Orr et al. 2016). For this reason, BOEM expects adverse impacts, if any, to be long term **negligible** adverse from offshore lighting.

Noise: Impacts to birds from operational noise and decommissioning of the offshore facilities would be similar to offshore construction impacts and result in **negligible** adverse impacts.

Presence of structures: Within the Atlantic Flyway along the North American Atlantic coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the Atlantic OCS, whereas land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). However, operation of the Proposed Action would result in impacts on some individuals of offshore bird species and possibly some individuals of coastal and inland bird species during spring and fall migration. These impacts could arise through direct mortality from collisions with WTGs and/or through behavioral avoidance and habitat loss (Drewitt and Langston 2006; Fox et al. 2006; Goodale and Millman 2016). To reduce the collision risk with WTGs, Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with a spacing of approximately 1.15 miles (1 nm) × 1.15 miles (1 nm) that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs is expected to allow birds to avoid individual WTGs and minimize risk of potential collision (see COP Table ES-1).

In COP Appendix AA (bri 2021), vulnerability was assessed to determine how sensitive a bird population is to mortality or habitat loss related to the presence of a wind farm and in terms of collision vulnerability

and displacement vulnerability. Factors considered in vulnerability assessments include vital rates, existing population trends, relative abundance, nocturnal flight activity, diurnal flight activity, avoidance, proportion of time within the RSZ, maneuverability in flight, percentage of time flying, and habitat flexibility. Avian flight heights were important in the assessment of behavioral vulnerability. Flight heights used in the assessment were gathered from OSAMP boat-based surveys (local) and datasets in the Northwest Atlantic Seabird Catalog (regional). Final exposure and vulnerability assessments for each taxonomic group and species are provided in Sections 3.4 through 3.10 of COP Appendix AA (bri 2021) and in Table 3-38 of COP Appendix AA (bri 2021).

The presence and operation of the offshore facilities may result in displacement of waterbirds, waterfowl, seabirds, and phalaropes that use the area for foraging, resting, or nighttime roosting. Some species can be displaced several kilometers outside the Lease Area (Welcker and Nehls 2016). Generally, the relative abundance of bird species that are most sensitive to displacement is low within the offshore portion of the Project during all seasons (bri 2021). These long-term adverse impacts would be **negligible** to **minor**, depending on whether birds are at high risk for displacement or are able to access preferred habitat, and these impacts may change over time if birds become habituated to the presence of the WTGs and OSSs. Impacts to birds from decommissioning of the RWF and offshore RWEC would be similar to those described for the construction phase.

The Lease Area is generally beyond the range of most breeding terrestrial or coastal bird species. Coastal birds that may forage in the Lease Area occasionally, visit the area sporadically, or pass through on their spring and/or fall migrations include shorebirds (e.g., sandpipers, plovers), waterbirds (e.g., cormorants, grebes), waterfowl (e.g., scoters, mergansers), wading birds (e.g., herons, egrets), raptors (e.g., falcons, eagles), and songbirds (e.g., warblers, sparrows). Overall, with the exception of migratory falcons and songbirds, coastal birds are considered to have minimal exposure to the Lease Area. Falcons, primarily peregrine falcons, may be exposed to the Lease Area. Some migratory songbirds, particularly the blackpoll warbler, may also be exposed to the Lease Area during fall migration, but population-level impacts are unlikely because exposure of the population to the Lease Area is expected to be minimal to low and limited to migration. Of the marine birds, loons, sea ducks, gulls, terns, and auks received up to a medium overall exposure assessment. Loons, sea ducks, gannets, and auks are documented to avoid wind farms, but displacement from the Lease Area is unlikely to affect populations because there is likely available foraging habitat outside the Lease Area (bri 2021).

Special-status bird species were also assessed, including golden eagle, bald eagle, red knot, piping plover, and roseate tern. The Project is not expected to affect special-status species populations. Golden and bald eagle exposure to the Lease Area is considered minimal because these species are rarely detected in the offshore environment. Red knots and piping plovers have the potential to be exposed only during migration, and vulnerability to collision is considered low because shorebirds fly substantially above the RSZ during migrations. Although tracked roseate terns were estimated to have passed through the northern portion of the Lease Area (bri 2021), individual impacts are unlikely because the birds were not detected in the Lease Area during surveys, and they would be primarily flying below the RSZ. A detailed analysis of the impacts from O&M and decommissioning of the offshore facilities on federally listed birds can be found in the BA (BOEM 2022).

Onshore Activities and Facilities

Accidental releases and discharges: The OnSS would require various oils, fuels, and lubricants to support its operation. As described above in Section 3.7.2.2.1, accidental discharges, releases, and disposal could indirectly cause bird habitat degradation; however, risks would be avoided through spill prevention and control measures and associated BMPs. Therefore, potential adverse impacts associated with discharges and releases are considered short term and localized **negligible** adverse.

Climate change: No measurable climate change impacts to birds from O&M of the onshore facilities are expected. Climate change impacts from decommissioning would be similar to those described for construction. Therefore, the adverse impacts from this IPF are expected to be long term **negligible** adverse.

Light: During the O&M of the OnSS and ICF, yard lighting would be used for assessment of equipment. In general, operational lighting would be limited to the minimum necessary to ensure safety and compliance with applicable regulations (see COP Table ES-1). Most decommissioning activities would occur during the day, and overnight lighting would only be necessary if there is work in progress on-site or lights are left on for safety and security purposes. Therefore, the adverse impacts resulting from this IPF would be long term **negligible**.

New cable emplacement/maintenance: Operation of the onshore transmission cable would pose no risk to birds because it would be buried. Land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height within the perimeters of the onshore facilities. Hazard tree removal would be performed on a cyclical basis to inspect and remove trees that may fail that are outside the edge of the maintained ROW. Land disturbance as it relates to vegetation clearing may result in the direct injury or mortality of birds. However, mortality and injury impacts would be mitigated by observing time-of-year restrictions on vegetation removal that would avoid the breeding season of bird species. Therefore, the adverse impacts resulting from this IPF would be **negligible**. Impacts from land disturbance during decommissioning would be similar to those described in Section 3.7.2.2.1, though the impacts would likely be less because new vegetation clearing, and grading would not be necessary.

Noise: According to the vhb (2021) onshore acoustic assessment, during O&M, the proposed OnSS and ICF would introduce new sources of sound, which is modeled to be 45.5 dBA (Leq) or less when measured at the nearest anthropogenic sensitive receptors and falls within the ambient sound range measured at baseline conditions. Temporary noise and construction-related traffic may occasionally be generated due to nonroutine maintenance. Pickup trucks or other automobiles would be used to make routine visits to the OnSS and ICF during O&M. Occasional maintenance and operational emergency visits may necessitate bucket trucks, cranes, and similar vehicles to facilitate these activities. Infrequent vehicle usage within the OnSS and ICF may create temporary noise-related disturbance to birds adjacent to the OnSS. However, such disturbance would be short term, and normal avian activity would likely resume after the traffic ceases. BOEM expects these adverse impacts to be **negligible**.

Presence of structures: The OnSS and ICF would be visible structures that would result in permanent bird habitat conversion and loss. The OnSS access road and fenced-in property would become nonhabitat and result in habitat fragmentation. The conversion of forested cover type outside the OnSS and ICF fences would alter the structural diversity within a forested area by adding more edge habitat. Considering the adjacent landscape consists primarily of residential and commercial developments with some undisturbed

areas of ruderal forested swamp, the adverse impacts to birds from the OnSS and the ICF on forested habitat fragmentation would be long term **negligible** to **minor**.

This change in the visible landscape would present a very minor risk of mortality or injury to birds due to collision with the OnSS or ICF, and, generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection near these structures (e.g., breeding habitat for some forest-dependent species may be less suitable). These impact risks would exist throughout the O&M phase of the Project. The potential for avian mortality or injury due to the low risk of collision with the OnSS and related structures would be a long-term **minor** adverse impact. The potential for avian avoidance behavior related to habitat conversion and loss from the OnSS would also be a long-term **minor** adverse impact. If the footprint of the OnSS and ICF yards are left in place after they have been decommissioned and equipment has been removed, the remaining development would still be considered a visible structure because it would remain a hard structure within a forested area. Adverse impacts to birds from habitat fragmentation related to a visible change in the landscape during decommissioning would be **negligible** because local populations would have adapted to the landscape changes.

3.7.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: Future offshore wind activities would contribute to an increased risk of spills and associated impacts due to fuel, fluid, or hazmat exposure. The contribution from future offshore wind and the Proposed Action would be a low and non-measurable percentage of the overall spill risk from all ongoing offshore activities. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be likely limited in extent and duration and would result in localized and temporary **negligible** adverse cumulative impacts on birds.

Anchoring and new cable emplacement/maintenance: The Proposed Action would add 7,258 acres of seafloor disturbance from the operation of WTG foundations and scour protection, RWEC and IAC installation, and anchoring to the No Action Alternative, which equates to 31% of the total seafloor disturbance estimated under the No Action Alternative. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased turbidity, and only non-measurable **negligible** adverse impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. In the context of reasonably foreseeable environmental trends, the combined cable emplacement impacts from ongoing and planned actions, including the Proposed Action, could occur if impacts are in close temporal and spatial proximity. However, these adverse impacts from anchoring and cable emplacement would be **negligible** and would not be biologically significant. For these reasons, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term **negligible** to **minor** cumulative adverse impacts to birds.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action. However, the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce

climate change impacts. Therefore, long-term **minor** adverse and long-term **negligible** beneficial cumulative impacts to birds are expected.

Light: The Proposed Action would add up to 100 new WTGs with red flashing aviation hazard lighting to the No Action Alternative; these lights could attract birds and result in increased collision risk (Hüppop et al. 2006). Additionally, marine navigation lighting would include one or more flashing white lights on each WTG and the OSSs and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and decommissioning would be minimal and limited to vessels transiting to and from wind farm areas. Ongoing and future non–offshore wind activities are expected to cause short-term impacts, primarily from vessel lights. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term **negligible** to **minor** adverse cumulative impacts to birds, and no individual or population-level impacts would be expected.

Noise: Pile driving and other construction noise and activity associated with the Proposed Action could add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, the Proposed Action's contribution to adverse noise impacts would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird's ability to survive and reproduce) or population-level effects would be expected. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **negligible** to **minor** adverse cumulative impacts to birds.

Presence of structures: The Proposed Action would add up to 100 additional WTGs and up to two OSSs compared to the No Action Alternative. The total cumulative foundations on the Atlantic OCS would be 3,110, and the Project would account for less than 4% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and would persist until decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be long term **minor** adverse and long term **minor** beneficial.

Onshore Activities and Facilities

Accidental releases and discharges: Onshore construction activities and operation of the OnSS under the Proposed Action could result in the accidental releases of fuel, fluids, or hazmat; sediment; and/or trash and debris. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. Ongoing and future onshore activities could contribute to impacts to birds from accidental releases if they occur at the same time within the GAA. However, incidences such as these would be mitigated by implementation of project-specific SPCC plans. In the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of a release and result in **negligible** adverse cumulative impacts to birds.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but no measurable change from the operational impacts of onshore activities and facilities to birds under the No Action Alternative is anticipated. Therefore, the

combined impacts from this IPF from ongoing and planned actions, including the Proposed Action and cumulative impacts, are expected to be long term **minor** adverse.

Light: Lighting used during construction of the Proposed Action would be limited to the minimum required for safety. Operational lighting would be limited to the minimum necessary to ensure safety and compliance with applicable regulations (see COP Table ES-1). Decommissioning activities would primarily occur during the day, and overnight lighting is not expected. Therefore, impacts to birds from the Proposed Action would be localized and temporary **negligible** to **minor** adverse. Ongoing and future onshore activities could contribute to impacts to birds from light if they occur at the same time within the GAA. However, these effects are also expected to be localized and temporary and would not contribute to adverse cumulative impacts to birds in the GAA.

New cable emplacement/maintenance: The Proposed Action would result in temporary ground disturbance from installation of the onshore transmission cable and construction at the landfall work area. Most of this temporary ground disturbance would occur in previously disturbed areas along paved roads or parking lots and would not result in impacts to bird habitat. Operation of the onshore transmission cable would pose no risk to birds because it would be buried, and no other impacts to bird species are anticipated during routine onshore operations. Therefore, the contribution of the Proposed Action on adverse cumulative impacts to birds from new cable emplacement or maintenance in the context of reasonably foreseeable onshore environmental trends within the GAA is expected to be **negligible** adverse.

Noise: Onshore construction activities would add to onshore noise, resulting in localized and temporary impacts to birds (i.e., avoidance and displacement), particularly if ongoing and planned onshore activities overlap with the Proposed Action in space and time. Normal operation of the OnSS would generate continuous noise. However, BOEM expects long-term **negligible** adverse impacts when considered in the context of the other commercial and industrial noises nearby. Therefore, in the context of reasonably foreseeable environmental trends, the combined impacts from this IPF from ongoing and planned actions, including the Proposed Action, would be localized and temporary due to the likely limited extent and duration of noise and would result in **negligible** adverse cumulative impacts to birds.

Presence of structures: The Proposed Action would result in the permanent conversion, loss, and fragmentation of onshore bird habitat through the removal of forested cover types for construction of the OnSS and the ICF. These actions could result in localized and temporary impacts to birds, including avoidance and displacement, although no individual fitness or population-level effects would be expected. These changes would have a **negligible** adverse effect on birds because forested habitat is common within the surrounding area. In addition, the permanent onshore facilities (ICF and OnSS) would be located on the edge of previously developed areas. The presence of these structures when considered in the context of ongoing and planned actions within the GAA would be a very minor risk of mortality or injury to birds due to collision, and generally, the changes to the habitat conditions would result in avoidance behavior and may influence bird habitat selection. Therefore, BOEM anticipates long-term **negligible** to **minor** adverse cumulative impacts to birds.

3.7.2.2.4 Conclusions

Project construction and installation and decommissioning would introduce noise, lighting, human activity, debris and contaminants, and new structures and vessels (increasing potential collision risk) to the GAA as well as alter existing bird habitat. Noise, lighting, and human activity impacts from Project

O&M would occur, although at lower levels than those produced during construction and decommissioning. Offshore structures would also represent a long-term collision risk. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse for the duration of the Project. Therefore, BOEM expects the overall impact on birds from the Proposed Action alone to be long term **minor** adverse; however, the resource would recover completely after decommissioning without remedial or mitigating action.

In the context with other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from temporary to long term **negligible** to **minor** adverse as well as long term **negligible** beneficial. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** cumulative adverse impacts to birds. This determination is because the impacts would not be expected to result in noticeable change to the condition of birds in the GAA, and the populations would recover completely without remedial or mitigating action.

3.7.2.3 Alternatives C, D, E, and F

Table 3.7-2 provides an analysis of all evaluated IPFs for birds across these alternatives.

3.7.2.3.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated IACs, which would have an associated reduction in potential collision risk, BOEM expects that the impacts to birds resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** adverse and **minor** beneficial). The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse.

3.7.2.4 Mitigation

Use of bird-deterrent devices and conducting marine construction activities during approved in-water work windows, which would be developed in consultation with NMFS and USFWS, would further reduce the expected negligible to minor long-term impacts on birds by minimizing bird attraction to operating WTGs and OSSs (see Table F-2 in Appendix F for details). Implementation of Revolution Wind's *Avian and Bat Post- Construction Monitoring Framework* (see Appendix G and COP Appendix AA) would not reduce impacts; however, the data gathered from the monitoring would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)). If the reported postconstruction bird and bat monitoring results indicate bird and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind would be required to recommend new mitigation measures or monitoring methods.

3.8 Coastal Habitats and Fauna

3.8.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Coastal Habitats and Fauna

Geographic analysis area: The GAA for coastal habitats and fauna (see Figure 3.8-1) comprises the construction footprints for the following onshore project components: the onshore transmission cable, landfall work area, OnSS, and ICF. The coastal habitats within the GAA include the area from state waters inland to the mainland, including the foreshore, backshore, dunes, and interdunal areas. Aquatic habitats are discussed in Section 3.21 and Section 3.6. Offshore components of the proposed Project would not impact coastal habitat and fauna other than certain avian and bat species, which are discussed in Section 3.7 and Section 3.5, respectively.

Affected environment: Appendix K of the COP includes the results of field investigations conducted for the Project's onshore facilities as well as descriptions of habitats, delineations of freshwater and coastal wetlands, identification of plant and wildlife species, records of rare species observations, and observations of invasive species (vhb 2021). Plant communities were documented by vhb and compared to the key habitat profiles provided in the RIWAP (Rhode Island DEM et al. 2015) to assign the appropriate plant communities within the analysis area. These plant communities are provided in Table 3.8-1 and described below. "Native coastal fauna" is defined herein as terrestrial mammals, reptiles, amphibians, and terrestrial and intertidal invertebrates. Most of the GAA for coastal habitats and fauna is disturbed from previous anthropogenic uses. Therefore, habitat quality and the potential suitability for use by fauna have been degraded. However, several key habitats, as identified in the RIWAP (Rhode Island DEM et al. 2015), suitable to a range of wildlife and plant species are present in the GAA. Invasive plant species are prevalent throughout the GAA because of prior anthropogenic disturbance (vhb 2021). vhb identified habitat for a variety of terrestrial mammals, reptiles, and amphibians during habitat assessment surveys conducted July 30, August 14, September 3, and December 10, 2019, and March 27 and July 13, 2020.

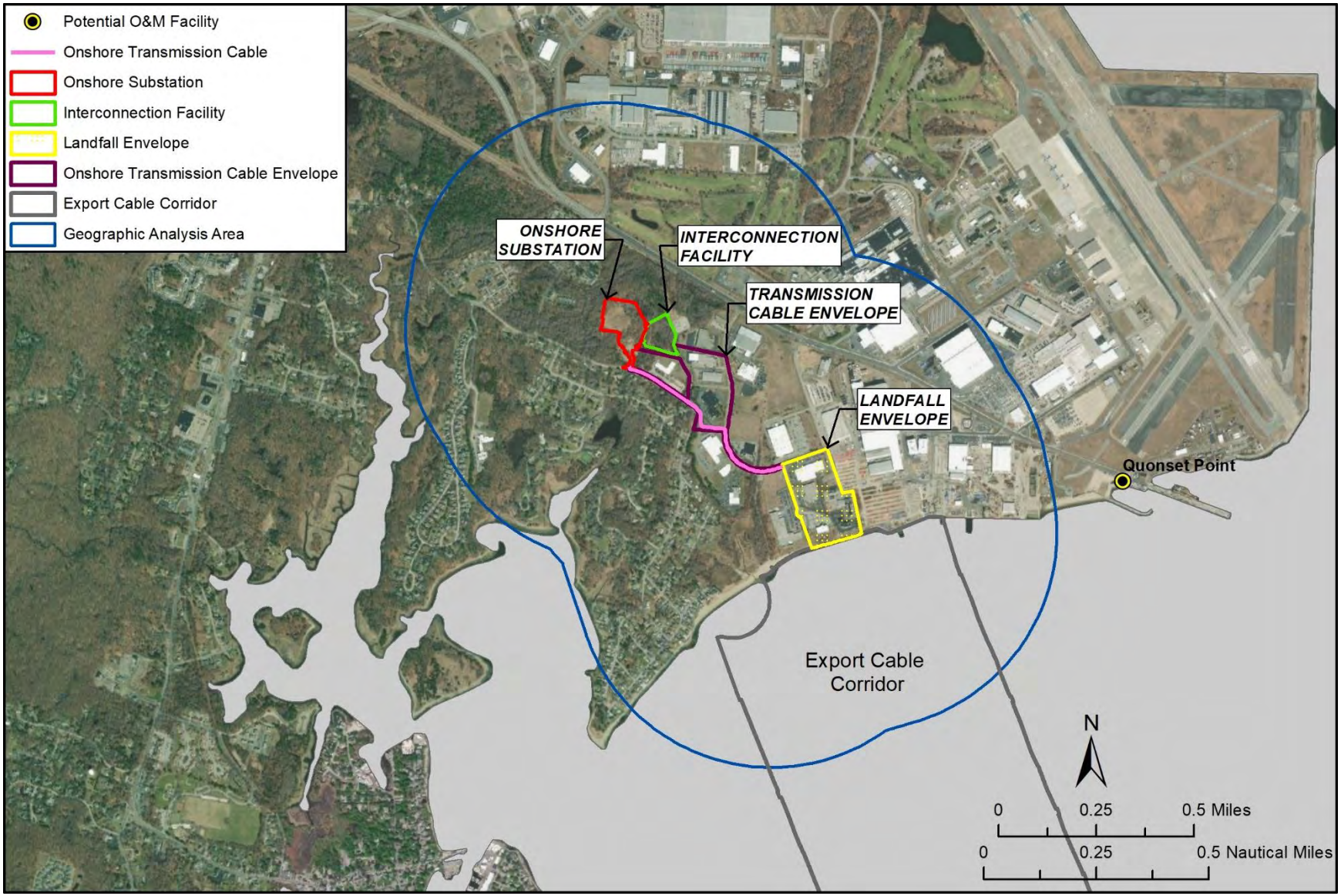

Figure 3.8-1. Geographic analysis area for coastal habitats and fauna.

Table 3.8-1. Plant Communities in the Geographic Analysis Area for Coastal Habitats and Fauna

Plant Community	Area in the Geographic Analysis Area (acres)
Landfall Work Area	
Modified coastal beach	0.330
Ruderal grassland/shrubland	1.300
OnSS	
Mixed oak/white pine forest	3.800
Capped landfill	2.600
Pitch pine barren	0.600
Ruderal shrub marsh	0.001
ICF	
Mixed oak/white pine forest	3.500
Ruderal forested swamp	0.100
Ruderal grassland/shrubland	0.050
Ruderal shrub marsh	0.010
Transmission Cable Envelope	
Mixed oak/white pine forest	0.560
Softwood forest	0.320
Mowed lawn	0.020
Ruderal grassland/shrubland	0.020
Oak forest	0.008
Pitch pine barren	0.006

Source: vhb (2021); Rhode Island DEM et al. (2015)

Landfall Work Area

The modified coastal beach plant community comprises areas within the landfall work area that have been altered by placement of seawalls and riprap revetments, which expose the sandy beach during low tides. Vegetation at the base of the seawall and along the top of the seawall includes spotted knapweed (*Centaurea maculosa*), an invasive species; common milkweed (*Asclepias syriaca*); prickly lettuce (*Lactuca serriola*); and American pokeweed (*Phytolacca americana*). Adjacent to areas of modified coastal beach, the landfall work area contains ruderal grassland/shrubland. Ruderal grasslands/shrublands constitute early successional habitats defined by Anderson et al. (1976) as uplands where the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs. Such habitats are typically anthropogenically created or maintained due to management strategies. The vegetation within ruderal grassland/shrubland areas is similar to the species composition along the seawall described above and also includes northern bayberry (*Myrica pensylvanica*) and eastern red cedar (*Juniperus virginiana*) (vhb 2021).

Transmission Cable Envelope

The transmission cable envelope is comprised primarily of industrial and residential land uses and consists of lots with managed lawns. Although managed lawn is not considered a key habitat by the RIWAP, it provides limited utility to some species of wildlife (e.g., passerines and rodents) in an otherwise heavily developed industrial and commercial area. It should be noted that some of these lots containing only managed lawn may be designated for future development (vhb 2021). The preferred transmission cable route is an approximate 1 mile (1.6 km) route that would predominantly follow along paved roads or previously disturbed areas such as parking lots.

Some of the alternative routes under consideration within the transmission cable envelope contain segments that would pass through undeveloped, vegetated areas and would be approximately the same length. Alternative transmission cable routes would pass a vacant lot that supports a dry ruderal grassland/shrubland field that gently slopes downward toward an access path. This plant community supports a mix of shrubs and herbaceous forbs and grasses, including eastern red cedar, pitch pine (*Pinus rigida*), *Yucca* sp., Virginia creeper (*Parthenocissus quinquefolia*), and common milkweed. The ruderal grassland/shrubland supports some invasive species, including autumn olive (*Elaeagnus umbellate*), Morrow's honeysuckle (*Lonicera morrowii*), Asiatic bittersweet (*Celastrus orbiculatus*), and mugwort (*Artemisia* sp.). Alternative onshore cable transmission routes would also pass through upland forest and shrubland. Vegetation within this area shows signs of anthropogenic disturbance and is composed of a ruderal mixed oak/white pine forest with a shrubby understory. Dominant vegetation within the canopy layer includes eastern white pine (*Pinus strobus*), red oak (*Quercus rubra*), white oak (*Quercus alba*), and eastern red cedar. Dominant species within the shrub and herb stratum include autumn olive, Morrow's honeysuckle, Asiatic bittersweet, multiflora rose (Rosa multiflora), green briar (*Smilax rotundifolia*), garlic mustard (*Alliaria petiolata*), and poison ivy (*Toxicodendron radicans*) (vhb 2021).

Onshore Substation and Interconnection Facility

The primary plant community within the footprint of both the OnSS and the ICF is mixed oak/white pine forest. Dominant species within the canopy include red oak, black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and eastern white pine, and other canopy species include red maple, black cherry *(Prunus serotina*), and black birch (*Betula lenta*). Understory vegetation includes Morrow's honeysuckle, common greenbrier, Virginia creeper, and spotted wintergreen (*Chimaphila maculata*). As with the adjoining ruderal forested swamp that occurs within the OnSS footprint (described below), the oak and white pine forest shows signs of human disturbance from its previous use as a landfill.

Ruderal forested swamp is also present within the OnSS footprint. The dominant canopy species within the forested swamp is red maple (*Acer rubrum*) with scattered patches of black gum (*Nyssa sylvatica*), swamp white oak (*Quercus bicolor*), red oak, and eastern white pine. The understory contains scattered sapling recruitment from the canopy layer and shrub thickets of sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), and alder (*Alnus* sp.). Poison ivy, green briar, sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*) are common in the herbaceous stratum. A ruderal shrub marsh is present in the northern part of the OnSS footprint. The southern boundary of the marsh is highly altered, with demolition debris stacked along slopes above the marsh. The northern limit of the marsh extends beyond the OnSS footprint based on

available topographic mapping and aerial photographs. The ruderal shrub marsh has a forested perimeter, and open water seasonally inundates the shrubland cover type (vhb 2021).

A large area (2.6 acres) within the OnSS footprint is considered capped landfill because of the alterations associated with the former Camp Avenue Dump, which is listed on the Superfund Enterprise Management System database as a State Hazardous Waste Site. From approximately 1949 to 1953, and as late as 1970, the Camp Avenue Dump was used as a general landfill by the U.S. Navy before the Quonset Point Naval Air Station was deactivated in 1974. Previous studies conducted at the dump, as well as field observations during Project surveys, reported wastes such as construction debris, roofing tar, ship parts, and unspecified industrial waste (vhb 2020a). Evidence of the site's past use as a landfill is present throughout with fill artifacts, disturbed topography that indicates previous cutting and filling, and pervasive invasive vegetation that includes glossy buckthorn (Frangula alnus), Asiatic bittersweet, Morrow's honeysuckle, black locust (Robinia pseudoacacia), multiflora rose, privet (Ligustrum sp.), tree of heaven (*Ailanthus altissima*), black swallow-wort (*Cynanchum louiseae*), mugwort, and garlic mustard (vhb 2021).

General wildlife records for the GAA are based on observations made during vhb's field investigations in July, August, September, and December 2019 and March and July 2020; the review of the RIWAP for species tied to specific key habitats within the GAA; and other pertinent literature, including *New England Wildlife: Habitat, Natural History, and Distribution* (DeGraaf and Yamasaki 2001). Appendix C in COP Appendix K (vhb 2021) provides a list of wildlife species observed during field investigations and species with the potential to occur within the GAA based on habitat preferences and habitat availability.

vhb evaluated information from the USFWS IPaC tool and the Rhode Island DEM ERM to assess if any federal or state-listed species; rare, threatened, or endangered species; or species of greatest conservation need were present within the analysis area. During field investigations for the onshore transmission cable, butterfly milkweed (*Asclepias tuberosa*), a Rhode Island state species of concern was recorded. Butterfly milkweed has showy orange flowers in umbels and occurs within disturbed habitats, grassland, meadows, and fields. As with other milkweed species, this plant provides important food sources for the larval form of butterfly species. This includes the monarch butterfly (*Danaus plexippus*), which is a candidate species under the federal ESA (Monarch Joint Venture 2019; USFWS 2019). In accordance with Rhode Island Natural Heritage Program (RINHP) policy, the occurrence of butterfly milkweed within these habitats will be reported to the RINHP during the state permitting process. No other federal or state-listed species; rare, threatened, or endangered species; species of greatest conservation need; or associated critical habitats, other than those discussed in Sections 3.5 and 3.7, were identified as having the potential to occur within the GAA for coastal habitats and fauna (BOEM 2022; vhb 2021).

3.8.1.1 Future Offshore Wind Activities (without Proposed Action)

Onshore Activities and Facilities

This section discloses potential coastal habitats and fauna impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Climate change: Impacts of climate change could contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Activities that contribute to climate change are provided in the Air emissions and climate change section in Section 3.4.1.1. Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the GAA for coastal habitats and fauna, these resources may be affected by climate change, sea level rise, more frequent and intense storms, and altered habitat. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that future offshore wind activities, without the Proposed Action, could have **negligible** adverse impacts on onshore coastal habitats and fauna.

Presence of structures: In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures as well as onshore substations and associated facilities. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand and will result in permanent loss of forested habitat for local bat populations. However, the increase from future offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand (BOEM 2019b). The current bearing capacity of existing ports is considered suitable for wind turbines, requiring no port modifications for supporting offshore wind energy development (DOE 2014). Land disturbance for construction of onshore substations, associated facilities, and port expansion activities in the GAA is expected to result in **negligible** to **minor** adverse impacts to coastal habitat and fauna.

3.8.1.2 Conclusions

Under the No Action Alternative, coastal habitats and fauna would continue to follow current regional trends and respond to current and future environmental and societal activities. The current state of local coastal habitat and fauna resources is generally stable, although some fauna may be subject to disturbance from ongoing activities in the GAA. For example, land disturbance from onshore construction of cables and structures periodically causes temporary and permanent habitat loss, temporary displacement, injury, and mortality, resulting in small short-term impacts on certain coastal fauna species. Climate change, influenced in part by GHG emissions, is altering the seasonal timing and patterns of certain species' distribution and ecological relationships, likely causing permanent impacts of unknown intensity. Considering current conditions and the modest pace of development in the GAA, coastal fauna resources are expected to remain generally stable under the No Action Alternative.

BOEM anticipates that the impacts of ongoing activities, especially onshore construction and climate change, would be negligible. In addition to ongoing activities, planned actions other than offshore wind may also contribute to impacts on coastal habitats and fauna. Planned actions other than offshore wind primarily consist of increasing onshore construction, although no future construction projects were identified within the GAA. BOEM anticipates that the impacts of planned actions other than offshore wind would be **negligible** adverse.

If any onshore components of future offshore wind activities overlap the GAA, impacts such as displacement, mortality, and/or habitat loss would be similar to those resulting from the proposed Project alone. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with future offshore wind activities combined with ongoing activities, reasonably foreseeable environmental trends,

and planned actions other than offshore wind in the GAA would result in **negligible** to **minor** adverse impacts, primarily through onshore construction (most are attributable to ongoing activities) and climate change.

3.8.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on coastal habitats and fauna include the location of the OnSS and ICF, the location of construction within the landfall work area and within the transmission cable envelope, and the time of year during which construction occurs. For example, the summer and fall months (May through October) constitute the most active season for coastal fauna in this area, especially reptiles and amphibians. Therefore, construction during months in which coastal fauna are not present, not breeding, or less active would have fewer impacts than construction during more active times.

The following EPMs would be implemented to minimize potential impacts to coastal habitats and fauna:

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to ecologically sensitive areas.
- The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- The transmission cable would be located primarily in unvegetated and previously disturbed or developed ROWs.

These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for coastal habitats and fauna across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-1 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.8-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination for that alternative. The overall impact of any alternative would be **minor** adverse because the effects on coastal habitats and fauna would be small, and the resource would be expected to recover completely, with no mitigation required.

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Table 3.8-2. Alternative Comparison Summary for Coastal Habitats and Fauna

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTGs	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Climate change	**Onshore**: Impacts of climate change could contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that future offshore wind activities, without the Proposed Action, could have **negligible** adverse impacts on onshore coastal habitats and fauna.	**Onshore**: Climate change would contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. The Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse. No additional impacts from climate change beyond those discussed under the impacts analysis for construction and installation are expected during O&M and Project decommissioning. The types of cumulative impacts from global climate change to coastal habitats and fauna described under the No Action Alternative would occur under the Proposed Action. However, the Project could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts (although effects would still be **negligible** to **minor** adverse).	**Onshore**: Alternatives C through F would not alter impacts to onshore activities. Therefore, construction, O&M and Project decommissioning impacts would be the same as those described for the Proposed Action: **negligible** adverse. Cumulative impacts would also be the same as those described for the Proposed Action: **negligible** to **minor** adverse.			
Presence of structures	**Onshore**: In addition to electrical infrastructure, some habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures as well as onshore substations and associated facilities. Land disturbance for construction of onshore substations, associated facilities, and port expansion activities in the GAA is expected to result in **negligible** to **minor** adverse impacts to coastal habitat and fauna.	**Onshore**: The operational footprints of the OnSS and ICF would create habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards that are not capable of supporting plants or wildlife. The ICF would result in a loss of approximately 1.6 acres of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would result in a loss of 3.8 acres of mixed oak/white pine forest. Together, these losses represent a relatively small fraction of the 52 acres of contiguous habitat identified in the RIWAP (vhb 2021) and represent a **negligible** to **minor** adverse impact to coastal habitats. Overall, the habitat loss that would result from the construction of the OnSS and ICF would be considered negligible because this loss would be small relative to the unimpacted similar habitat in the general region. At the OnSS and ICF, land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height. Presence of structures as it relates to vegetation clearing may result in the direct injury or mortality of wildlife as well as habitat alteration or removal. Impacts from vegetation management may include reduction in habitat quality via the spread of invasive species and temporary displacement of individuals. However, the spread of invasive species would be controlled with periodic vegetation management, and wildlife displacement could occur only during vegetation removal activities. The impact of habitat degradation and wildlife displacement resulting from vegetation management of the OnSS and ICF is expected to be short term **negligible** adverse. The impact of habitat degradation and/or loss, wildlife displacement, and wildlife injury and/or mortality resulting from land disturbance during decommissioning of the OnSS and ICF would be short term **negligible** adverse. Because of the small amount of affected onshore habitat, land disturbance from the Proposed Action when added to other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to coastal habitats and fauna.	**Onshore**: Alternatives C through F would not alter impacts to onshore activities. Therefore, construction, O&M and Project decommissioning impacts would be the same as those described for the Proposed Action: **negligible** to **minor** adverse. Cumulative impacts would also be the same as those described for the Proposed Action: **negligible** to **minor** adverse.			

Note: Each cell includes analysis for the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

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3.8.2.2 Alternative B: Impacts of the Proposed Action on Coastal Habitats and Fauna

3.8.2.2.1 Construction and Installation

Onshore Activities and Facilities

Climate change: Climate change would contribute to impacts on coastal habitats and fauna primarily according to existing global and regional climate trends. Although sources of GHG emissions contributing to regional and global climate change mostly occur outside the GAA for coastal habitats and fauna, these resources may be affected by climate change, sea level rise, more frequent and intense storms, and altered habitat. The Proposed Action could contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts. Although the impacts resulting from climate change on coastal habitats and fauna are uncertain, BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse.

Presence of structures: The OnSS would occupy an operational footprint measuring up to 3.8 acres and would connect to the ICF with two 115-kV underground transmission cables up to 527 feet long. Additionally, the OnSS would include a compacted gravel driveway, stormwater management features, and associated landscaped or managed vegetated areas totaling up to 7.1 acres inclusive of the up-to-4-acre operational footprint of the facility. The adjacent ICF would have an operational footprint of 1.6 acres and would also include a paved access road, stormwater management features, and associated landscaped or managed vegetated areas within the approximate 4.0-acre construction footprint. Construction of these facilities would result in habitat loss and habitat conversion in the areas surrounding the RWEC, the OnSS, and the ICF. The operational footprints of the OnSS and ICF would create habitat loss when forested upland is cleared and replaced with hard structures and crushed gravel yards that are not capable of supporting plants or wildlife. The ICF would result in a loss of approximately 1.6 acres of mixed oak/white pine forest, which is reflective of the operational footprint of the ICF. The OnSS would result in a loss of 3.8 acres of mixed oak/white pine forest. Together, these losses represent a relatively small fraction of the 52 acres of contiguous habitat identified in the RIWAP (vhb 2021) and represent a **negligible** to **minor** adverse impact to coastal habitats.

In addition to impacts on the mixed oak and white pine forest, the OnSS would develop 0.6 acre of pitch pine barren. The OnSS has been designed to avoid occurrences of sickle-leaved golden aster (*Pityopsis falcata*), a plant species of state concern within Rhode Island that were observed within the pitch pine barren outside of the footprint of the OnSS (vhb 2021). In accordance with the state environmental permitting needed for the Project, the occurrence of this state-listed species must be reported to the Rhode Island DEM, which will advise if a mitigation plan will be needed. Overall, the habitat loss that would result from the construction of the OnSS and ICF would be considered negligible because this loss would be small relative to the unimpacted similar habitat in the general region. As previously described in the impacts discussion for the landfall work area, land disturbance and habitat alteration from the construction of the OnSS and ICF could cause habitat degradation through the spread of invasive species. As noted previously, invasive plant growth within the OnSS parcels is pervasive. Invasive plant species were also observed throughout the forested portion of the ICF parcel (vhb 2021). This observation indicates that invasive species are likely to become further established in these areas if proper management techniques are not followed.

3.8.2.2.2 Operations and Maintenance and Decommissioning

Onshore Activities and Facilities

Climate change: No additional impacts from climate change beyond those discussed under the impacts analysis for construction and installation described in Section 3.8.2.2.1 are expected during O&M and Project decommissioning. BOEM anticipates that the Proposed Action would have no measurable influence on climate change and therefore the resulting impacts to coastal habitats and fauna would be **negligible** adverse.

Presence of structures: At the OnSS and ICF, land disturbance in the form of vegetation management would occur on a periodic basis to maintain vegetation at shrub height. Vegetation control methods would employ integrated vegetation management practices, including manual cutting, mowing, the prescriptive use of herbicides, and the use of environmental and cultural controls (Eversource 2018). The method of control would be determined following inspections of the site scheduled for maintenance. The current maintenance cycle for vegetation control using integrated vegetation management practices is 3 or 4 years depending on the vegetation composition, facilities, and site conditions (Eversource 2018). Hazard tree removal would also be performed on a cyclical basis to inspect and remove trees that may fall that are outside the edge of maintained ROWs. Presence of structures as it relates to vegetation clearing may result in the direct injury or mortality of wildlife as well as habitat alteration or removal. Impacts from vegetation management may include reduction in habitat quality via the spread of invasive species and temporary displacement of individuals. However, the spread of invasive species would be controlled with periodic vegetation management, and wildlife displacement could occur only during vegetation removal activities. The impact of habitat degradation and wildlife displacement resulting from vegetation management of the OnSS and ICF is expected to be short term **negligible** adverse.

At the end of the Project's operational life, the OnSS and ICF would be decommissioned in accordance with a detailed Project decommissioning plan that would be developed at that time. OnSS and ICF equipment may be removed while keeping the substation yard and fencing intact. Under such a scenario, land disturbance and habitat alteration activities may be similar to those described under the construction impact analysis, although the impacts would likely be less because new vegetation clearing and grading would not be necessary. The impact of habitat degradation and/or loss, wildlife displacement, and wildlife injury and/or mortality resulting from land disturbance during decommissioning of the OnSS and ICF would be short term **negligible** adverse.

3.8.2.2.3 Cumulative Impacts

Onshore Activities and Facilities

Climate change: The types of cumulative impacts from global climate change to coastal habitats and fauna described under the No Action Alternative would occur under the Proposed Action. However, the Project could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts (although effects would still be **negligible** to **minor** adverse).

Presence of structures: Construction and installation, O&M, and decommissioning of the OnSS under the Proposed Action would contribute to the habitat conversion and habitat loss described under the No Action Alternative, potentially changing the composition and abundance of faunal assemblages through

the removal of forested habitat at the OnSS and ICF. Because of the small amount of affected onshore habitat, land disturbance from the Proposed Action when added to other past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to coastal habitats and fauna.

3.8.2.2.4 Conclusions

In summary, the activities associated with the Proposed Action may affect coastal habitats and fauna through temporary land disturbance, injury or mortality of individuals, and permanent conversion of a small proportion of the overall habitat available regionally. Considering the avoidance, minimization, and mitigation measures proposed, construction of the Proposed Action alone would likely have negligible to minor impacts on coastal habitats and fauna. The Proposed Action would contribute to the cumulative impact rating primarily through the temporary displacement, mortality, temporary to permanent habitat loss, and noise generated from construction of the OnSS and ICF. Considering all the IPFs together, BOEM anticipates that the impacts to coastal habitats and fauna from ongoing and planned actions, including the Proposed Action, would likely be **minor** adverse in the GAA because the measurable impacts expected would be small and/or the resource would likely recover completely when the impacting agent is gone and remedial or mitigating action is taken. The main drivers for this impact rating are ongoing and future land disturbance and ongoing climate change.

3.8.2.3 Alternatives C, D, E, and F

Table 3.8-2 provides a summary of IPF findings for these alternatives.

3.8.2.3.1 Conclusions

The overall impacts of Alternatives C through F to coastal habitats and fauna when combined with past, present, and reasonably foreseeable activities would be the same as under the Proposed Action: **minor** adverse.

3.8.2.4 Mitigation

No potential additional mitigation measures for coastal habitats and fauna are identified in Table F-2 in Appendix F.

3.9 Commercial Fisheries and For-Hire Recreational Fishing (see section in main EIS)

3.10 Cultural Resources (see section in main EIS)

3.11 Demographics, Employment, and Economics (see section in main EIS)

3.12 Environmental Justice (see section in main EIS)

3.13 Finfish and Essential Fish Habitat (see section in main EIS)

3.14 Land Use and Coastal Infrastructure

3.14.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Land Use and Coastal Infrastructure

Geographic analysis area: The GAA for land use and coastal infrastructure is the Town of North Kingstown, Rhode Island, and the ports potentially used for Project construction and installation, O&M, and decommissioning. The ports included as part of the GAA include port facilities and surrounding areas at Sparrow's Point, Paulsboro Marine Terminal, Port of Brooklyn, Port Jefferson, Port of Montauk, Port of New London, Port of Davisville at Quonset Point, Port of Galilee, Port of Providence, and the New Bedford Marine Commerce Terminal. The Proposed Action and other reasonably foreseeable wind energy projects may use the port facilities shown in Figure 3.14.1. While the extent of port facilities and upgrades are unknown at this time, land use impacts could occur at these 10 port facilities and surrounding areas, which is why they are included in the land use and coastal infrastructure GAA.

The GAA also includes the 18 BOEM OCS Lease Areas that range from the offshore Norfolk, Virginia, area in the south to the offshore Rhode Island area in the north (see Figure 3.14-1). Appendix E contains detailed descriptions of these port facilities and Lease Areas. These areas encompass locations where BOEM anticipates direct and indirect impacts associated with proposed onshore facilities and ports.

Affected environment: The Town of North Kingstown, one of 10 towns in Washington County, is located south of Providence, Rhode Island, and is bordered on the south by the towns of South Kingstown and Narragansett, on the north by East Greenwich, on the west by Exeter, and on the east by Narragansett Bay. North Kingstown is the second-largest Washington County town, with a population of 26,323 in 2019 (U.S. Census Bureau 2019). It is part of the Providence metropolitan area, with a land area of approximately 58 square miles.

North Kingstown is a primarily residential community characterized by a mixture of farms, natural areas, cultural centers, villages, historic districts and towns, and countryside (Interface Studio 2019). There are several unique points of interest in the town, including the Davis Memorial Wildlife Refuge, Smith's Castle, and Quonset Point, among others. Land use within the Town of North Kingstown largely comprises small areas of low-density residential enclaves surrounded by forests, brushland, and pastures. North Kingstown also contains areas with mines, quarries, and gravel pits, as well as industrial and commercial hubs. The waterfront areas of North Kingstown include transportation facilities such as the Port of Davisville at Quonset Point, open space, high-density residential, wetlands, and other uses.

The proposed RWEC landing site would be within the landfall envelope described in the COP (see COP Figure 2.2.1-3), which totals approximately 20 acres, located at the Port of Davisville at Quonset Point in North Kingstown (see COP Figure 1.1-1). The landfall envelope is generally bounded by Whitecap Drive on the west, the Electric Boat property on the east, and Circuit Drive on the north. Within the landfall envelope is a landfall work area measuring up to 3.1 acres. The landfall work area is part of The Port of Davisville at Quonset Point, which is the location of the former Naval Air Station Quonset Point. The landfall work area consists of several onshore elements:

- Up to two underground transmission circuits (called the onshore transmission cable), co-located within a single corridor
- An OnSS and ICF located adjacent to the existing Davisville Substation

- An underground ROW connecting the OnSS to the ICF (Interconnection ROW)
- An overhead ROW connecting the ICF to the Davisville Substation (TNEC ROW)

Land uses in the landfall envelope are primarily commercial and industrial. This area of the Port of Davisville at Quonset Point is part of the Quonset Business Park and contains several large businesses, including boat and pool manufacturers, medical laboratories, distribution centers, lumber distributors, and office space, among others (SO Rhode 2014). The landfall envelope area contains a few manufacturing and industrial buildings, associated parking lots, and access roads. Blue Beach, a public beach, is approximately 500 feet west of the southwest corner of the landfall envelope. Blue Beach is accessed via a trail located to the west of the Hayward Industries, Inc., building, which is just outside the landfall envelope. Compass Rose Beach, another public beach, is approximately 2,600 feet east of the southeast corner of the landfall envelope. The Martha's Vineyard Fast Ferry dock is located directly east of Compass Rose Beach. The eastern edge of the Quonset State Airport is also approximately 2,600 feet east of the landfall envelope. The North Kingstown Golf Course is approximately 2,000 feet north of the northern edge of the landfall envelope and is separated from the landfall envelope by Roger Williams Way.

Regardless of the landfall site selected, The preferred onshore transmission cable route is an approximate 1-mile (1.6-km) route that will predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable envelope, as depicted on Figure 4.3.1-2 in the COP. Some of the routes under consideration have segments that would be installed in undeveloped, vegetated areas within parcels 179-003 and 179-005 (the Davisville Substation parcel), although most would be installed within paved roads and parking lots, as with the preferred onshore transmission cable route, and would be approximately the same length. Regardless of the exact route chosen, impact determinations would not be affected for any IPF (COP Figure 4.3.1-2). Land uses around the onshore Project footprint consist of low-density residential, commercial, public lands on the south side of Camp Avenue, and other commercial and industrial uses. There are two public beaches in the Project vicinity, Blue Beach and Compass Rose Beach, as well as three small schools. Based on the Town of North Kingstown's Assessors' Data (Interface Studio 2019), the segment of the RWEC from the mean high water level to the transition joint bays (TJBs), landfall work area, and onshore transmission cable are located within an area that is predominantly industrial but also consists of some large business commercial, low-medium residential (including single-family residences and duplexes), and undeveloped land uses. The property hosting the OnSS and ICF is surrounded by low-medium residential, medium-high-density residential, utility (i.e., the existing Davisville Substation), and undeveloped land uses. The OnSS will be located on two adjacent parcels (179-030 and 179-001) totaling 15.7 acres, both owned by the Rhode Island Commerce Corporation. The ICF will be located on an adjacent 6.1-acre parcel (179-005) owned by TNEC. COP Figure 4.6.7-1 (vhb 2022) depicts land uses in the vicinity of the onshore components of the Project.

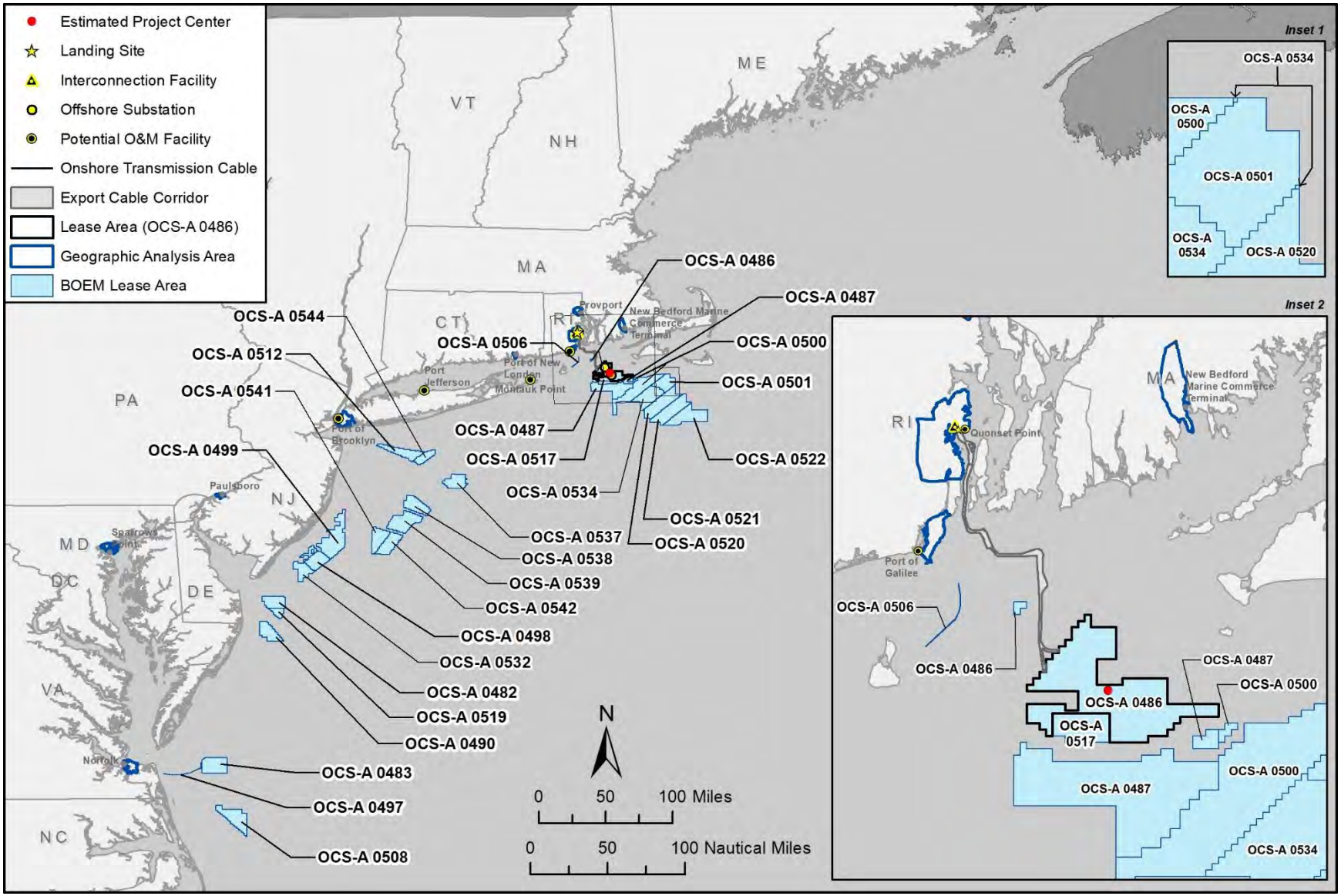

Figure 3.14-1. Geographic analysis area for land use and coastal infrastructure.

An OnSS and ICF would be constructed to support interconnection to the existing Davisville Substation, which is located within the Quonset Business Park in North Kingstown. The Davisville Substation operates at 115 kV and connects to the regional transmission grid via two 115-kV transmission tap lines. The existing substation is within North Kingstown Assessor's Plat 179 Lot 005. The OnSS location is on the north side of Camp Avenue in an area that is undeveloped. The Town of North Kingstown has designated the undeveloped area as a planned village development that is surrounded by the Quonset Business Park District (Town of North Kingstown, Rhode Island 2021a). The RWEC would enter the landfall work area underground, pass through the transition joint bays, and continue underground as the Onshore Transmission Cable to the OnSS. The connection cables running from the OnSS to the ICF would be underground. The cables connecting from the ICF to the existing Davisville Substation would be the only aboveground and overhead cables (vhb 2022).

Port of Davisville at Quonset Point, a port located in North Kingstown, is a former naval air station that was subsequently redeveloped into a modern industrial park (Interface Studio 2019). The industrial park, known as Quonset Point/Davisville Business Park, is on a peninsula in Narragansett Bay. The port is a multimodal transportation area with deepwater piers used for both shipping and ship repairs, an airport with the longest runway in the state, freight and passenger rail facilities, and interstate highway connections. The availability of a variety of industrially zoned land with full-service networks provides opportunities for new industries (Maguire Group, Inc. 2008). The Port of Davisville at Quonset Point is served by Rhode Island Route 403 and a railroad spur from Amtrak's Northeast Corridor, along with freight service provided by the Providence and Worcester Railroad. It is also the home of the Port of Davisville at Quonset Point, a golf course, four public beaches, ferry service to Martha's Vineyard, and two museums.

Other port facilities in New York, Rhode Island, Connecticut, Virginia, Massachusetts, Maryland, and New Jersey could also support construction of the RWF and offshore components of the RWEC (see COP Table 3.3.10-1). These ports are generally industrial in character and are typically adjacent to other industrial or commercial land uses and major transportation corridors. Before construction begins, Revolution Wind would finalize mobilization plans and arrangements at port facilities to support Proposed Action activities, including logistic support for fabrication, as needed (vhb 2022). See Section 3.9, Section 3.11, and Section 3.18 for discussions of recreational vessel and commercial fishing activity in these ports.

3.14.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential land use and coastal infrastructure impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E2.

Accidental releases and discharges: Future offshore and onshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). Trash and contaminant spills would be minimized by vessel compliance with USCG regulations. In the event of a spill, adjacent properties and coastal infrastructure could be temporarily restricted. The exact extent of restrictions and other impacts would depend on the locations of landfall, substations, and cable routes, as well as the ports used to support future offshore wind energy projects. These impacts, however, would

generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse.

New cable emplacement/maintenance: Future offshore activities could result in onshore land disturbances to accommodate supporting cable infrastructure for offshore wind development. Land disturbance impacts would largely be limited to the construction and installation phase of any such projects and would be localized in nature.

Onshore, neighboring or adjacent land to cable placement could temporarily be disturbed by future offshore wind project–related noise, vibration, and dust, as well as travel delays along impacted roads. The simultaneous construction and installation of two or more onshore development projects and/or landing sites and onshore cable routes would generate cumulative short-term impacts to land use. State and local agencies would be responsible for managing actions to help minimize and avoid noise, air quality, and other impacts on nearby neighborhoods during construction and installation. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of land disturbance on land use under the No Action Alternative would be short term and **negligible** adverse**.**

Light: Future offshore activities could result in onshore lighting associated with supporting infrastructure for offshore wind development. These lighting sources would be minor adverse and short term in nature. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.**

Permanent aviation warning lighting on any offshore wind WTGs proposed as part of future offshore wind activities would be visible from south-facing beaches and coastlines. Visibility would depend on distance from shore, topography, and atmospheric conditions but would be long term. If this lighting alters visitor behavior, land use in the form of tourism, recreation, and property values could subsequently be impacted. Lighting from substations could also affect the adjacent property use and residential development. However, new substations constructed as part of future offshore wind activities would likely be constructed near existing energy infrastructure or where land development regulations, such as zoning and land use plan designations, allow such uses. Therefore, land use would not be expected to be measurably changed, nor would light itself impact land uses or alter land use patterns. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.**

Noise: Future offshore activities could result in onshore noise associated with clearing and grading, construction and installation of aboveground and underground utility infrastructure and impervious surfaces, and other disturbances. These noise sources would be **minor** adverse and short term in nature.

Future offshore wind activities could result in increased noise during the construction and installation phases. Given the location of these projects within the RI/MA WEA (see Figure 1.1-2), there would be no noise impacts on land use from construction and installation, O&M, and decommissioning of the offshore components of future offshore wind activities. Future offshore wind activities could result in onshore noise impacts during construction and installation, O&M, and decommissioning of onshore elements of future offshore wind activities due to increased construction, traffic, dust, vibration, and other impacts. These noise impacts would be subject to state and local noise regulations and ordinances and therefore would have limited adverse impacts on land use due to the impacts occurring under regulatory thresholds.

On this basis, the effects of noise on land use under the No Action Alternative would be long term and **negligible** adverse.

3.14.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on land use and coastal infrastructure associated with the Project would not occur. However, ongoing and future offshore wind activities would have continuing temporary to long-term impacts on land use and coastal infrastructure, primarily through onshore construction and installation and port activities.

BOEM anticipates that impacts for reasonably foreseeable offshore wind activities would be **minor** adverse. Impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** adverse, as discussed in Appendix E, Table E2-13. Accidental releases, electromagnetic fields (EMF), land disturbance, light, noise, and port utilization could have temporary adverse impacts on local land uses, but as a whole, ongoing use and development would support the region's diverse mix of land uses and provide support for continued maintenance and improvement of coastal infrastructure.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA, combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind, would result in **minor** adverse impacts because the overall effect would be localized and short term.

3.14.2 Environmental Consequences

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

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

The following design parameters would result in reduced impacts relative to those generated by the design elements considered under the PDE:

- The use of a casing pipe method to construct the RWEC sea-to-shore transition would eliminate the need for a temporary cofferdam, resulting in less extensive acoustic and vibration impacts than vibratory pile driving to construct a cofferdam thus reducing onshore noise and vibration impacts to coastal land uses (Zeddies 2021).
- The selection of an 8-MW WTG design would reduce the total WTG height from 873 to 648 feet, reducing the visual impact of the facility on coastal land uses.
- The selection of an alternate route for the onshore component of the RWEC could alter the location and increase or decrease the extent of construction-related ground disturbance, but the nature and overall significance of these impacts on land use would remain unchanged.

See Appendix E2 for a summary of IPFs analyzed for land use and coastal resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Table E2-13. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.14-1 provides a summary of IPF findings carried forward for analysis. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on land use. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. Overall, impacts to land use and coastal infrastructure from any action alternative would be **minor** adverse because they would be small, and the resource would be expected to recover completely with no mitigating action required.

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Table 3.14-1. Alternative Comparison Summary for Land Use and Coastal Infrastructure

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Offshore**: Future offshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). These impacts, however, would generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse.	**Offshore**: Accidental releases and discharges of fuels, lubricants, and hydraulic fluids could occur during the construction and installation phase. Accidental releases would be minimized by containment and cleanup measures detailed in the Emergency Response Plan/OSRP. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure. The Proposed Action and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water and air quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in **negligible** adverse cumulative impacts on land use and coastal infrastructure because there would be no impact on land use and coastal infrastructure.	**Offshore**: Alternative C to F would require fewer vessel trips relative to the Proposed Action, reducing the risk of accidental releases and discharges from vessels. However, given the likelihood of such releases is low, the difference in level of risk would likely be undetectable. Likewise, risk of accidental releases and discharges could be slightly reduced from the reduced risk of vessel collisions/allisions. Because accidental releases and discharges in the offshore environment of the scale anticipated are not expected to measurably impact land use and coastal infrastructure, these impacts would similarly be **negligible** adverse.			
	Onshore: Future onshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.21 for quantities and details). These impacts, however, would generally be localized and short term. On this basis, the effects of accidental releases and discharges on land use under the No Action Alternative would be long term and **minor** adverse.	**Onshore**: While accidental releases and discharges could impact land use and coastal infrastructure by introducing air or water quality contamination into areas undergoing construction and installation, O&M and decommissioning, it is anticipated that containment would prevent or mitigate discharges before they can impact land uses. Therefore, there would be a temporary, **negligible** adverse impact due to accidental releases and discharges on land use and coastal infrastructure.	**Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from accidental releases and discharges would be effectively the same as those described for the Proposed Action: **negligible** adverse.			
Light	**Offshore**: Permanent aviation warning lighting on any offshore wind WTGs proposed as part of future offshore wind activities would be visible from south-facing beaches and coastlines. However, land use would not be expected to be measurably changed, nor would light itself impact land uses or alter land use patterns. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse.	**Offshore**: There would be a temporary increase in the amount of lighting during construction and installation due to the presence of work vessels. Given that offshore elements of the Proposed Action would be located approximately 12 to 15 miles from shore, it is anticipated that there would be very little lighting impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action. Therefore, there would be a temporary, **negligible** adverse light impact on land use and coastal infrastructure. During operations, offshore structures would require lighting that conforms to FAA and BOEM guidelines, and USCG requirements. The visibility of WTGs and potentially the OSSs would result in a small impact to onshore land uses and coastal infrastructure by increasing light in the offshore environment that could be visible onshore and could slightly increase visible light in coastal communities. Decommissioning impacts would be similar to impacts from the Proposed Action construction and installation. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action. The Proposed Action and other reasonably foreseeable projects would be expected to comply with applicable permit conditions and lighting requirements to minimize, reduce, or avoid light impacts on onshore land uses and coastal infrastructure. Therefore, the cumulative impact would be **negligible** adverse.	**Offshore**: While Alternatives C through F could result in a slight reduction in construction lighting, the effects of this IPF on land use and coastal infrastructure under the Habitat Alternative would otherwise be similar to those described for the Proposed Action, ranging from **negligible** adverse to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	Onshore: Future offshore activities could result in onshore lighting associated with supporting infrastructure for offshore wind development. These lighting sources would be minor adverse and short term in nature. On this basis, the effects of light on land use under the No Action Alternative would be long term and **minor** adverse**.**	**Onshore**: Nighttime lighting could have a temporary adverse impact on land use and coastal infrastructure by increasing artificial lighting that could be visible by residences and businesses nearby. Operational lighting onshore would be limited to the OnSS and ICF. In general, lighting would be minimal and directed downward. Lighting would be removed as part of decommissioning. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from construction, O&M, and decommissioning of onshore elements of the Proposed Action. Temporary and permanent lighting would require compliance with local development regulations at the port facilities and locations where reasonably foreseeable future projects would experience onshore lighting impacts. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.	**Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from lighting would be effectively the same as those described for the Proposed Action: **minor** adverse.			
New Cable Emplacement/Maintenance	**Onshore**: Future offshore activities could result in onshore land disturbances to accommodate supporting cable infrastructure for offshore wind development. Onshore, neighboring or adjacent land to cable placement could also temporarily be disturbed by future offshore wind project–related noise, vibration, and dust, as well as travel delays along impacted roads. All construction and operational impacts from land disturbance would be regulated through local land use and zoning regulations and would therefore comply with applicable laws. On this basis, the effects of land disturbance on land use under the No Action Alternative would be short term and **negligible** adverse.	**Onshore**: All Proposed Action-related construction and installation would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts. Therefore, there would be a short-term, **minor** adverse land disturbance impact on land use and coastal infrastructure. Once installed, the onshore components of the RWEC would be located underground and disturbed areas would be restored to preconstruction conditions or improved. Due to the temporary and intermittent nature of O&M activities, O&M of onshore facilities would have a **negligible** adverse impact on land use over the 35-year lifespan of the Project. The Project and other reasonably foreseeable future projects would be required to comply with local land use and zoning regulations, which would reduce impacts to land use and coastal infrastructure. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.	**Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from new cable emplacement/maintenance would be effectively the same as those described for the Proposed Action, ranging from **negligible** adverse to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Noise	**Offshore**: Future offshore wind activities could result in increased noise during the construction and installation phases. These noise impacts would be subject to state and local noise regulations and ordinances. On this basis, the effects of noise on land use under the No Action Alternative would be long term and **negligible** adverse.	**Offshore**: While offshore noise associated with the Proposed Action construction could be audible onshore, it would be below ambient noise levels and therefore would have a minimal impact on land use and coastal infrastructure. Therefore, there would be a temporary, **negligible** adverse noise impact on land use and coastal infrastructure. There would be no noise impacts on land use and coastal infrastructure from O&M of offshore facilities. Therefore, the impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action would be **negligible** adverse. Noise associated with the Project and reasonably foreseeable offshore wind activities are not expected to generate noise levels that would be audible onshore. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse.	**Offshore**: Under Alternatives C through F, fewer monopiles would be constructed and installed. While Alternatives C through F could result in a slight reduction in construction noise, the effects of this IPF on land use and coastal infrastructure would otherwise be similar to those described for the Proposed Action. Therefore, the impact on land use and coastal infrastructure would be **negligible** adverse, which is the same impact determination as the Proposed Action.			
	Onshore: Future offshore activities could result in onshore noise associated with clearing and grading, construction and installation of aboveground and underground utility infrastructure and impervious surfaces, and other disturbances. These noise sources would be **minor** adverse and short term in nature.	**Onshore**: Noise and traffic would result from construction and installation of the onshore facilities. EPMs would minimize, but not eliminate, noise effects on surrounding land uses. However, these effects would be short term and generally consistent with noise impacts associated with general development under zoned land uses (vhb 2021b). Therefore, there would be short term, **minor** adverse noise impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action. Noise generated by onshore facilities and O&M and decommissioning activities would be managed under existing local ordinances and regulations as permitted for the approved zoning. As such, noise impacts on land use from the O&M and decommissioning of onshore facilities would have a **negligible** adverse effect on land use. It is expected that noise impacts generated by other planned and foreseeable future actions would similarly be consistent with local ordinances applicable to zoned land uses. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would have a **negligible** adverse effect on land use and coastal infrastructure.	**Onshore**: Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to land use and coastal infrastructure from noise would be effectively the same as those described for the Proposed Action, ranging from **negligible** adverse to **minor** adverse.			

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3.14.2.2 Alternative B: Impacts of the Proposed Action on Land Use and Coastal Infrastructure

3.14.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: Accidental releases and discharges of fuels, lubricants, and hydraulic fluids could occur during the construction and installation phase. These impacts are covered in Section 3.21. A draft OSRP has been prepared for the Project and consists of processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills. A release during construction and installation of the Proposed Action would generally be localized, short term, and **minor** adverse, resulting in little change to water quality.

Offshore accidental releases and discharges during construction and installation would not result in land use and coastal infrastructure impacts, as incorporation of water quality EPMs described in Appendix F would aid in reducing the chances of accidental releases and discharges; accidental releases and discharges would be contained and mitigated according to federal, state, and local law. Applicable EPMs in Appendix F include compliance with regulatory requirements related to the prevention and control of spills and discharges, implementation of an OSRP to manage accidental spills or releases of oils or other hazardous materials, and compliance with USCG and EPA regulations. Therefore, potential offshore accidental releases and discharges would be unlikely to result in onshore land use and coastal infrastructure impacts, as these impacts would be mitigated prior to any impacts affecting onshore resources. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure during construction and installation of offshore elements of the Proposed Action, as there would be no effect from offshore accidental releases and discharges on land use and coastal infrastructure.

Light: There would be a temporary increase in the amount of lighting during construction and installation due to the presence of work vessels. In general, lights would be required on offshore platforms and structures, vessels, and construction equipment during construction and installation of the RWF. In addition, temporary work lighting would illuminate work areas on vessel decks or service platforms of adjacent WTGs or OSS platforms during nighttime construction. Project construction lighting would meet USGS requirements, when required by federal regulations.

The RWEC would also require USCG-approved navigation lighting for all vessels during construction and installation of the RWEC. All vessels operating between dusk and dawn would be required to turn on navigation lights. Cable laying could occur 24 hours a day during certain periods, and these vessels would be illuminated at night for safe operations. Given that offshore elements of the Project would be located approximately 12 to 15 miles from shore, it is anticipated that there would be very little lighting impact on land use and coastal infrastructure from construction and installation of offshore elements of the Project. Therefore, there would be a temporary, **negligible** adverse light impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action.

Noise: Construction and installation of offshore elements of the Project would result in increased noise. The proposed Project would be approximately 15 miles west of the Town of New Shoreham, Rhode Island, (Block Island) and 15 to 20 miles south of several other coastal towns in Rhode Island including South Kingstown, Narragansett, Jamestown, Newport, Middletown, and Little Compton. The Project

would be approximately 12 miles east/southeast of Martha's Vineyard, Massachusetts, and 13 to 16 miles south of other coastal towns in Massachusetts such as Westport, Dartmouth, and Gosnold. The maximum pile-driving noise from construction and installation of offshore Project elements audible from coastal towns would be 11.2 dBA, which is below ambient noise levels at towns in the vicinity, which range from 25 to 45 dBA during the night and 35 to 55 dBA during the day (vhb 2020). While offshore noise associated with the Proposed Action could be audible onshore, it would be below ambient noise levels and therefore would have a minimal impact on land use and coastal infrastructure. Therefore, there would be a temporary, **negligible** adverse noise impact on land use and coastal infrastructure from construction and installation of offshore elements of the Proposed Action.

Onshore Activities and Facilities

Accidental releases and discharges: Installation of the RWEC at the landfall location would use an HDD approach to install the cables under the beach and intertidal water areas. The use of drilling fluid, which typically consists of a water and bentonite mud mixture or another non-toxic drilling fluid, would be required. Bentonite is a natural clay that is mined from the earth. While these fluids are considered non-toxic, Revolution Wind would implement applicable EPMs listed in Appendix F during construction to minimize potential releases of the drilling fluid associated with HDD activities.

Solid wastes and construction debris would be generated predominately during construction and installation of onshore facilities. Per requirements outlined in 30 CFR 585.626, maximum quantities of and disposal methods for liquids and solid wastes, including hazardous materials, are summarized in COP Section 3.3.9.4 for construction. COP Table 3.3.1-2 also outlines maximum quantities of disposal methods for liquids and solid wastes, including hazardous materials for the OnSS. A spill prevention control and countermeasures plan would be developed in support of NPDES compliance and the potential for discharges and releases from onshore construction and installation would be governed by Rhode Island regulations and the Project's COP. It is anticipated that construction and installation of the OnSS would generate approximately 3,000 cy of solid waste that would be disposed of in a landfill and/or recycling center (vhb 2022).

In accordance with applicable federal, state, and local laws, comprehensive measures would be implemented prior to and during construction and installation activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. Construction and installation of onshore elements could result in accidental releases and discharges of solid wastes and construction debris that could impact land use; however, the Project would implement applicable EPMs (see Appendix F) and comply with federal, state, and local regulations to reduce the impacts to land use and coastal infrastructure. Some of the EPMs listed in Appendix F include containing drilling fluids for later reuse, creating an HDD contingency plan and SESC plan, and compliance with the RIPDES General Permit for Stormwater Discharges associated with Construction Activities.

While accidental releases and discharges could impact land use and coastal infrastructure by introducing air or water quality contamination into areas undergoing construction and installation, it is anticipated that containment measures outlined above would prevent or mitigate discharges before they can impact land uses. Therefore, there would be a temporary, **negligible** adverse impact due to accidental releases and discharges on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

New cable emplacement/maintenance: Airborne noise, vibration and dust, and increased vehicle traffic associated with construction and installation of the RWEC landing site and onshore export cable components would temporarily disturb neighboring land uses along the RWEC route. Portions of the development footprint could also be fenced and inaccessible at various points during construction and installation. Construction and installation activities causing these impacts consist of HDD for the RWEC, preparation and installation of TJBs that connect the RWEC and onshore transmission cable, and installation of the onshore transmission cable.

The onshore transmission cable would be installed within an underground duct bank between the TJBs and the OnSS and would be installed within or along previously disturbed areas including the shoulders of existing public roadways, lands owned by Quonset Development Corporation, and private properties. The onshore transmission cable would result in 3.1 acres (1.3 hectares) of land disturbance but would be located outside wetlands and other waterbodies. The landfall work area would require clearing, grading, and hardening to support the installation of the TJBs and would temporarily result in up to 3.1 acres (1.3 ha) of land disturbance. The TJBs would be excavated and installed underground within the landfall work area and access inside the TJBs would be provided by manholes. Therefore, land disturbance associated with the TJB area would be temporary. As discussed above, the onshore transmission cable, landfall work area, and TJBs would result in temporary impacts only. In addition, work would be sited in uplands and all activities would be conducted in compliance with the RIPDES General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved SESC plan. Therefore, with the implementation of the EPMs outlined in Appendix F, land disturbance activities during construction and installation of the onshore transmission cable are expected to result in direct and short-term water quality impacts (vhb 2022).

Construction and installation of the Project's onshore components would require construction staging in parking lots adjacent to or near the landing site. While most of the construction staging would occur on private property, construction could reduce public parking available at the Blue Beach parking lot during construction and installation. These disturbances would be short term, with construction expected to begin in Quarter 1 of 2023 and last approximately 8 months (see COP Section 3.2). Construction along public roadways would be completed in a matter of days or weeks. At the landing site, the Project would make the physical connection between the offshore RWEC and the onshore RWEC in two underground TJBs. The only long-term, visible components of the cable system would be the manhole covers (vhb 2021a).

Onshore construction and installation would include trench excavation and placement of the onshore RWEC within existing paved roads. Revolution Wind would abide by local construction ordinances. Construction and installation would occur primarily during normal daylight hours except for certain activities associated with cable installation at the chosen landing site (vhb 2021a) that could require nighttime activity to meet rapid construction timelines and to reduce the chances of equipment failure. Revolution Wind would work with the Town of North Kingstown to develop a detailed plan that includes traffic and other control measures prior to beginning major construction. The traffic plan with North Kingstown would identify appropriate alternative routes that would accommodate projected traffic loading during construction and installation activities. BOEM assumes that the Project would avoid permanent disruption to existing underground utilities, such as water, sewer, and electrical lines. However, depending on the exact placement of the onshore RWEC cable, the physical size and location of the cable could hamper future installation of public utilities such as water, sewer, and stormwater lines, which are typically placed beneath roadway travel lanes. Vehicular and construction equipment emissions

would be similar to those described for offshore development. The potential impacts from construction and diesel-generating equipment would be reduced through EPMs related to fuel-efficient engines and dust control plans, as outlined in Section 3.4.1.

All Project-related construction and installation would take place within areas zoned for industrial and commercial development and would be subject to land use and zoning regulations that limit impacts. Therefore, there would be a short-term, **minor** adverse land disturbance impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

Light: Most onshore construction and installation would be completed during daytime hours. Typical construction work hours for the Project would be 7:00 a.m. to 6:00 p.m. Monday through Friday when daylight permits and 7:00 a.m. to 5:00 p.m. on Saturdays. This is consistent with the Town of North Kingstown noise ordinance (Town Code Article VI). However, some work tasks, such as concrete pours, landfall installation, and cable pulling or splicing, once started, require completion without interruption and could go beyond normal work hours. In addition, the nature of transmission line construction and installation requires line outages for certain procedures such as transmission line connections, equipment cutovers, or stringing under or over other transmission lines. These outages are dictated by ISO New England and can be very limited based on regional system load and weather conditions. Work requiring scheduled outages and crossings of certain transportation and utility corridors may be required on a limited basis outside of normal work hours, including Sundays and holidays.

For nighttime construction and installation work, portable floodlights with a maximum height of approximately 18 feet would be used. All lights on portable lightstands would be downward facing. Any nighttime lighting used during construction and installation would comply with safety and security and local requirements.

Construction equipment, the OnSS, ICF, and structures within the TNEC ROW would be visible during construction and installation. Although construction is expected to take place primarily during the daylight hours between 7:00 a.m. and 6:00 p.m., some temporary lighting may be required outside those hours. Certain activities associated with cable installation at the chosen landing site (vhb 2022) could require nighttime activity and lighting to meet rapid construction timelines and to reduce the chances of equipment failure. Nighttime lighting could have a temporary adverse impact on land use and coastal infrastructure by increasing artificial lighting that could be visible by residences and businesses nearby. Therefore, there would be a temporary, **minor** adverse light impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

Noise: Noise and traffic would result from construction and installation of the onshore facilities. As described within the Onshore Acoustic Assessment in COP Appendix P2, long-term ambient sound measurements conducted within the proposed layout of the onshore facilities ranged from 44 to 45 dBA (Leq) at night (10:00 p.m. to 7:00 a.m.) and 49 to 50 dBA during the day (7:00 a.m. to 10:00 p.m.) (vhb 2021b). Operation of construction equipment and construction-related traffic would increase the ambient noise between the typical construction hours of 7:00 a.m. and 6:00 p.m. during the approximately 1-year construction period. The onshore facilities construction noise sources would include equipment used to support the HDD operations at the landfall work area, equipment used to support trenching and cable pulling, and construction vehicles such as excavators, dump trucks, and paving equipment (vhb 2021b).

Temporary construction and facility installation noise would be consistent with noise sources typically associated with a working industrial park. Short-term construction noise impacts would be generated during HDD onshore for the RWEC. A cofferdam could be used to ensure a dry environment during construction and installation and to manage sediment and would align with HDD exit pits. If the cofferdam is required, the cofferdam could be installed as either a sheet piled structure into the seafloor or a gravity cell structure placed on the seafloor using ballast weight. If the cofferdam is installed using sheet pile, a vibratory hammer would be used to drive the sidewalls and endwalls into the seafloor. Installation of the sheet pile cofferdam could take approximately up to 14 days. Noise associated with possible sheet pile installation would produce the maximum amount of noise compared to other construction methods. In general, noise generated by RWEC construction and installation activities would occur during daytime hours (7:00 a.m. to 8:30 p.m.), and would be largely generated by an excavator, crane, and sheet pile driver. If the HDD methodology is selected for construction of the RWEC, HDD operations would occur continuously to minimize the risk of soil settlement and equipment failures and would create noise during nighttime hours (vhb 2021b). Noise generated by construction and installation activities is expected to comply with the Town of North Kingstown noise code. The closest residences to the construction and installation of the onshore transmission cable, ICF, and OnSS are the residences on the south side of Camp Avenue and east side of Mill Creek Drive, which are within a few hundred feet of the construction area. The Onshore Acoustic Assessment (vhb 2021b) analyzed onshore construction noise and found that sound levels around the onshore transmission cable, ICF, and OnSS would be between 40 and 45 dB at residences along the south side of Camp Avenue and east side of Mill Creek Drive, which would be below ambient levels, measured between 44 and 45 dBA (Leq) at night and 49 to 50 dBA during the day at the time of the analysis.

During construction and installation of the onshore elements of the RWEC, construction noise could approach or exceed the Town of North Kingstown's noise code limit for construction and installation activities at receptors immediately adjacent to the road ROW. EPMs for onshore construction and installation activities include coordination with local governments and compliance with appropriate local ordinances governing noise, light, and traffic impacts consistent with zoned land uses (see Appendix F). These EPMs would minimize, but not eliminate, noise effects on surrounding land uses. However, these effects would be short term and generally consistent with noise impacts associated with general development under zoned land uses. Therefore, there would be short term, **minor** adverse noise impact on land use and coastal infrastructure from construction and installation of onshore elements of the Proposed Action.

3.14.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: The WTGs and OSSs would be designed to contain any potential leakage of fluids, thereby preventing the discharge fluids into the ocean. During WTG operations, small accidental leaks could occur because of broken hoses, pipes, or fasteners. During WTG maintenance, small releases could occur during servicing of hydraulic units or gearboxes. Any accidental leaks within the WTGs would be contained within the hub and main bed frame or tower. During operations, the only discharges to the sea that are anticipated are those associated with vessels performing maintenance. (see Appendix D of the COP) (vhb 2022). Decommissioning impacts would be similar to construction and installation impacts discussed above. Any offshore leakage of fluids would not impact land use and

coastal infrastructure due to the design feature of WTGs to capture accidental releases and discharges and because implementation of EPMs in Appendix F would minimize the potential for spills. Therefore, there would be a **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action.

Light: During operations, offshore structures would require lighting that conforms to FAA and BOEM guidelines, and USCG requirements. BOEM has indicated that offshore lighting should meet standard specifications in FAA Advisory Circulars 70/7460-1L, Change 2 (FAA 2018), and 150/5345-43H (FAA 2016), and USCG standards for marine navigation lighting.

Lighting associated with the Proposed Action would follow lighting and marking design parameters as identified in BOEM's Draft Proposed Guidelines for Providing Information on Lighting and Marking of Structures Supporting Renewable Energy Development, released April 2021 (BOEM 2021). Control, lighting, marking, and safety systems would be installed on each WTG; the specific systems would vary depending on the turbine selected and would be reviewed as part of the federal approval process.

Offshore turbines must be visible not only to pilots in the air, but also mariners navigating on water. In daylight, offshore wind turbines do not require lighting if the tower and components are painted white. The FAA and USCG consider white-colored turbines to be the most effective early warning technique for both pilots and mariners (Patterson 2005). Marine navigation lighting is regulated by the USCG through 33 CFR 67. Structures must be fitted with lights for nighttime periods. The OSSs would be lit and marked in accordance with FAA and USGS requirements for aviation and navigation obstruction lighting, respectively. Lighting on the RWEC during the O&M phase would be short term and limited to the lighting required on vessels while operating along the corridor. As described above for RWF construction and installation, USCG-approved navigation lighting is required for all vessels operating between dusk and dawn.

While WTGs and the OSSs would be lit, only a relatively small portion of the onshore locations would have open views of the Project. A viewshed analysis of the Project determined that only 44.9 square miles of land within the 6,113 square mile Visual Study Area could have potential views of the Project from ground level (EDR 2021). The visibility of WTGs and potentially the OSSs would result in a small impact to onshore land uses and coastal infrastructure by increasing light in the offshore environment that could be visible onshore and could slightly increase visible light in coastal communities. Decommissioning impacts would be similar to impacts from Project construction and installation. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action.

Noise: There would be no noise impacts on land use and coastal infrastructure from O&M of offshore facilities. Operational noise would not be audible onshore. Decommissioning impacts would be similar to impacts from Project construction and installation. Therefore, because there would be no effect, the impact on land use and coastal infrastructure from O&M and decommissioning of offshore elements of the Proposed Action would be **negligible** adverse.

Onshore Activities and Facilities

Accidental Releases and Discharges: The OnSS and ICF would require various oils, fuels, and lubricants to support its operations (see COP Table 3.3.1-2 and COP Table 3.3.1-3). Equipment would be mounted

on concrete foundations with concrete secondary fluid containment designed for 110% containment and in accordance with industry and local utility standards. With EPMs, accidental release and discharge impacts to land use and coastal infrastructure from onshore O&M would be minimal. Decommissioning would incur similar impacts to those during the construction and installation phase. Therefore, there would be a temporary, **negligible** adverse impact from accidental releases and discharges on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action due to implementation of containment measures and compliance with industry and utility standards.

New cable emplacement/maintenance: Once installed, the onshore components of the RWEC would be located underground and disturbed areas would be restored to preconstruction conditions or improved. Buried Project features would have no effect on adjacent land uses or coastal infrastructure. Revolution Wind has designed the Project to account for site-specific oceanographic and meteorological conditions within the analysis area, effectively avoiding the potential for beach erosion to expose the RWEC at the sea to shore transition zone.

Due to the temporary and intermittent nature of O&M activities, O&M of onshore facilities would have a **negligible** adverse impact on land use over the 35-year lifespan of the Project.

Impacts during decommissioning would be similar to the impacts during construction and installation. For onshore decommissioning, any removal of the underground, onshore cables (if not decommissioned in place) could result in temporary construction disturbances and delays along the affected roads and near the landing sites. The length and extent of these delays would be shorter in duration compared to those experienced during installation. However, all O&M activities would be consistent with local land use and zoning regulations and would be typical activities associated with industrial and commercial land uses. Therefore, there would be a temporary, **negligible** adverse land disturbance impact on land use and coastal infrastructure from decommissioning of onshore elements of the Proposed Action.

Light: Operational lighting onshore would be limited to the OnSS and ICF. Lighting at these facilities include 1) yard lighting and 2) task lighting. Both categories would be switched lights and would only be used during yard-based activity. The mounting heights for the lighting would range from 10 to 25 feet off the ground and the lights would be mounted on lamp posts, substation buildings, fire walls, or steel substation structures. The wattage for the individual lamps would range from 35 watts to 300 watts depending on the use. Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and are mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25° from the horizon. The task lighting at both the OnSS and ICF would support emergency maintenance or repairs to the station equipment outside of normal business hours. The task lights would be mounted to direct light toward substation equipment to ensure adequate lighting for workers to perform emergency maintenance or repairs.

Considering the presence of an existing electrical substation and industrial uses of the area, new lighting associated with the OnSS and ICF could adversely affect residences directly adjacent to these facilities. These effects could be reduced through the use of EPMs such as visual screening. Lighting for the OnSS and ICF would be designed to the minimum standard necessary for substation safety and security per utility operational requirements, as well as state and local regulations. General yard lighting would be provided within the OnSS and ICF area for assessment of equipment. In general, yard lighting would be off at night unless lighting is necessary for in-progress site work or for safety and security.

In general, lighting would be minimal and directed downward. Lighting would be removed as part of decommissioning. Therefore, there would be a long-term, **minor** adverse light impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action.

Noise: Operational noise of the underground cables is expected have no impacts to current land uses because there would be no permanent noise-generating equipment associated with the onshore transmission cable. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels; therefore, operational noise levels would have a direct but small impact on land use and coastal infrastructure. The proposed OnSS would introduce new sources of sound including transformers, shun reactors, harmonic filters, and cooling and ventilation associated with the outdoor substation equipment, as well as condensers, pumps, skids, and auxiliary transformers associated with the synchronous condenser building. Sound from the substation would be 43.9 dBA or lower at the closest noise sensitive receptors, which would be below the EPA guideline for noise exposure (48.6 dBA Leq) and below the Town of North Kingston, Rhode Island, nighttime noise ordinance limit for residential properties (50 dBA). Operational sound from the OnSS would also be below 50 dBA at the nearest residential property lines and below 70 dBA at the nearest commercial/industrial property lines, which is below the noise ordinance noise limits (vhb 2021b). O&M vehicles and certain maintenance activities performed during O&M could also periodically generate noise audible to surrounding land uses throughout the life of the Project; generated noise would be similar to typical traffic noise and noise from general construction and installation activities. These continuous and intermittent impacts would be permanent. Noise generated by onshore facilities and O&M activities would be managed under existing local ordinances and regulations as permitted for the approved zoning. As such, noise impacts on land use from the O&M of onshore facilities would have a **negligible** adverse effect on land use. Decommissioning would generate noise similar to that during the construction and installation phase. Therefore, there would be a long-term **negligible** adverse noise impact on land use and coastal infrastructure from O&M and decommissioning of onshore elements of the Proposed Action.

3.14.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action and other reasonably foreseeable future projects could result in accidental release of contaminants, trash, and debris that could add to releases from other reasonably foreseeable projects. The combined offshore accidental release impacts on land use and coastal infrastructure could increase the risk of and potential impacts from accidental releases in the GAA. The Proposed Action and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water and air quality. Land use and coastal infrastructure would be unlikely to be impacted by offshore accidental releases, as accidental releases would be mitigated offshore. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in **negligible** adverse cumulative impacts on land use and coastal infrastructure because there would be no impact on land use and coastal infrastructure.

Light: The Proposed Action would add permanent lighting for up to 102 WTGs and two OSSs. Although this lighting would be visible, in part, from south-facing beaches and coastlines, this represents a small but noticeable (3%) increase over total estimated WTG and OSS foundations providing long-term lighting

under the No Action Alternative if all projected offshore wind projects are constructed. BOEM estimates a maximum cumulative total of 3,110 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects. The land use impacts from the Proposed Action in the context of reasonably foreseeable future actions would be more extensive than impacts for the Proposed Action alone. However, the Proposed Action and other reasonably foreseeable projects would be expected to comply with applicable permit conditions and lighting requirements to minimize, reduce, or avoid light impacts on onshore land uses and coastal infrastructure. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would be **negligible** adverse impacts.

Noise: There would be no noise impacts on land use and coastal infrastructure from offshore facilities. Noise associated with construction and installation, O&M, and decommissioning would not be audible onshore. Similarly, reasonably foreseeable activities are not expected to generate noise levels that would be audible onshore. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative, which are described as having no onshore impacts from offshore facilities and would be **negligible** adverse impacts.

Onshore Activities and Facilities

Accidental releases and discharges: Installation of the RWEC at the landfall location would use an HDD approach to install the cables under the beach and intertidal water areas. Discharge of drilling fluids, solid wastes, and construction debris is possible during construction and installation. Additionally, discharge of oils, fuels, and lubricants is possible at the OnSS and ICF during Project operations and during maintenance activities. The Project would implement EPMs (see Appendix F) and comply with federal, state, and local regulations to reduce the impact to land use and coastal infrastructure. Reasonably foreseeable future projects would also require the construction of onshore facilities at identified ports along the Atlantic coast. Installation of onshore elements of reasonably foreseeable future projects could also result in the discharge of drilling fluids, solid wastes, construction debris, lubricants, oils, fuels, and other hazardous materials during construction, installation, and decommissioning. In context of reasonably foreseeable future actions, the combined offshore accidental release impacts on land use and coastal infrastructure could increase the risk of and potential impacts from accidental releases in the GAA. Other reasonably foreseeable actions would also be required to implement EPMs and adhere to federal, state, and local regulations to ensure that accidental releases and discharges are minimized and mitigated appropriately. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on land use and coastal infrastructure.

New cable emplacement/maintenance: The Proposed Action would result in increased onshore land disturbance during the construction and installation phase of the Project. It would result in temporary increases in construction noise, vibration and dust, and intermittent delays in travel along impacted roads. O&M activities would include periodic inspections and repairs at cable access manholes, which would require minimal use of worker vehicles and construction equipment. Reasonably foreseeable projects are expected to also result in land disturbances consistent with the Proposed Action in terms of scale, intensity, and duration at the ports and other facilities across the Atlantic coast where these projects are

expected to occur. Assuming that new substations for future offshore wind projects would be in locations designated for industrial or utility uses, and underground cable conduits would primarily be co-located with roads or other utilities, operation of substations and cable conduits would not affect the established and planned land uses for a local area. Additionally, the Project and other reasonably foreseeable future projects would be required to comply with local land use and zoning regulations, which would reduce impacts to land use and coastal infrastructure. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.

Light: There would be temporary and permanent light impacts under the Proposed Action. Temporary lighting impacts would occur with Project construction, installation, and decommissioning. While most onshore construction and installation would be completed during daytime hours, some tasks could extend beyond daylight work hours and would require the use of portable floodlights that would face downward. There would also be long-term permanent light impacts associated with O&M. Operational lighting would be limited to the OnSS and ICF. All operational lighting would be required to comply with Quonset Development Corporation lighting regulations. Other reasonably foreseeable projects would also generate onshore lighting impacts similar in nature to the Proposed Action. While many of these lighting impacts would be short term and temporary during Project construction and installation, some lighting associated with onshore facilities would be permanent, resulting in long-term lighting impacts in the vicinity of the OnSS and ICF. Temporary and permanent onshore lighting impacts are expected during construction, installation, O&M, and decommissioning of reasonably foreseeable future projects, including any port upgrades at port facilities described in Appendix E. These impacts are expected to be similar in scale to the lighting impacts for the Proposed Action but distributed across port facilities along the Atlantic coast. Temporary and permanent lighting would require compliance with local development regulations at the port facilities and locations where reasonably foreseeable future projects would experience onshore lighting impacts. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on land use and coastal infrastructure.

Noise: There would be noise impacts associated with the construction and installation of the Proposed Action. Construction and installation would be limited to daylight hours and noise impacts would consist of noise generated from heavy equipment used for clearing, grading, excavation, foundation installation, and heavy lifting of substation components. Noise modeling conducted for operations of the OnSS (vhb 2021b) indicates that predicted noise levels would be below the minimum disturbance thresholds specified by code (Article VI, Sec. 8-87[a]) (Town of North Kingstown, Rhode Island 2021b). No permanent noise-generating equipment would be associated with the onshore transmission cable, resulting in no impacts to current land uses from operational noise. The OnSS and ICF, as designed, would generate sound similar to or below existing ambient sound levels, as described in Section 3.14.2.2.2; therefore, operational noise levels would have a direct but small impact on land use and coastal infrastructure by increasing noise levels in the vicinity of onshore elements of the Proposed Action. Additionally, O&M and maintenance vehicles could result in increased noise in the vicinity when maintenance is being performed. However, all equipment and O&M activities would be designed for and consistent with zoned land uses and appropriate ordinance restrictions, as described in Section 3.14.2.2.2. It is expected that noise impacts generated by other planned and foreseeable future actions would be generally similar to those generated under the Proposed Action, and those actions would similarly manage

impacts consistent with local ordinances applicable to zoned land uses. Therefore, cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable future activities would have a **negligible** adverse effect on land use and coastal infrastructure.

3.14.2.2.4 Conclusions

Proposed Action construction and installation and decommissioning would temporarily generate noise, vibration, and vehicular traffic. Impacts during O&M would be expected to be similar, but in lower duration and extent. Therefore, BOEM expects the overall impact on land use and coastal infrastructure from the Proposed Action alone to be **minor** adverse. Proposed Action O&M would also generate long-term, **minor** beneficial impacts by supporting designated uses at ports and potentially promoting port improvements and/or redevelopment, though no port improvements are currently proposed as part of this project.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land use and coastal infrastructure. BOEM made this call because, while port use during construction and installation could result in **moderate** adverse impacts, the overall effect when impacts are considered over the entire GAA and analysis duration would be small and the resource would be expected to recover completely.

3.14.2.3 Alternatives C, D, E, and F

Table 3.14-1 provides a summary of IPF findings for these alternatives.

3.14.2.3.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and possibly reduce the miles of IAC, these changes would not measurably affect land use and coastal infrastructure. Therefore, BOEM expects that the impacts to land use and coastal infrastructure resulting from the alternative would be similar to the Proposed Action and would result in **minor** adverse impacts, which is the same impact determination as the Proposed Action.

The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse.

3.14.2.4 Mitigation

No potential additional mitigation measures for land use and coastal infrastructure are identified in Table F 2 in Appendix F.

3.15 Marine Mammals (see section in main EIS)

3.16 Navigation and Vessel Traffic (see section in main EIS)

3.17 Other Uses (see section in main EIS for Scientific Research and Surveys)

3.17.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Other Uses

Geographic analysis area: The GAAs for Other Uses are as follows (Figure 3.17-1):

Aviation and air traffic: Airspace and airports used by regional air traffic.

Land-based radar: Includes air space used by regional traffic.

Marine mineral resources and dredged material disposal: Areas within 0.25 mile of the Project and footprints of other cables and wind lease areas in the RI/MA WEA (not analyzed in detail in this chapter; see Appendix E2).

Military and national security: An area roughly bounded by Montauk, New York; Providence, Rhode Island; Provincetown, Massachusetts; and within a 10-mile buffer from wind lease areas in the RI/MA WEA.

Offshore energy uses: Other known wind energy project locations (not analyzed in detail in this chapter; see Appendix E2).

Undersea cables: Area within 1 mile of the Project and other undersea facilities and wind lease areas in the RI/MA WEA.

These areas encompass locations where BOEM anticipates direct and indirect impacts associated with Project construction and installation, O&M, and decommissioning. The scientific research survey area encompasses the locations where scientific research and surveys are anticipated to occur.

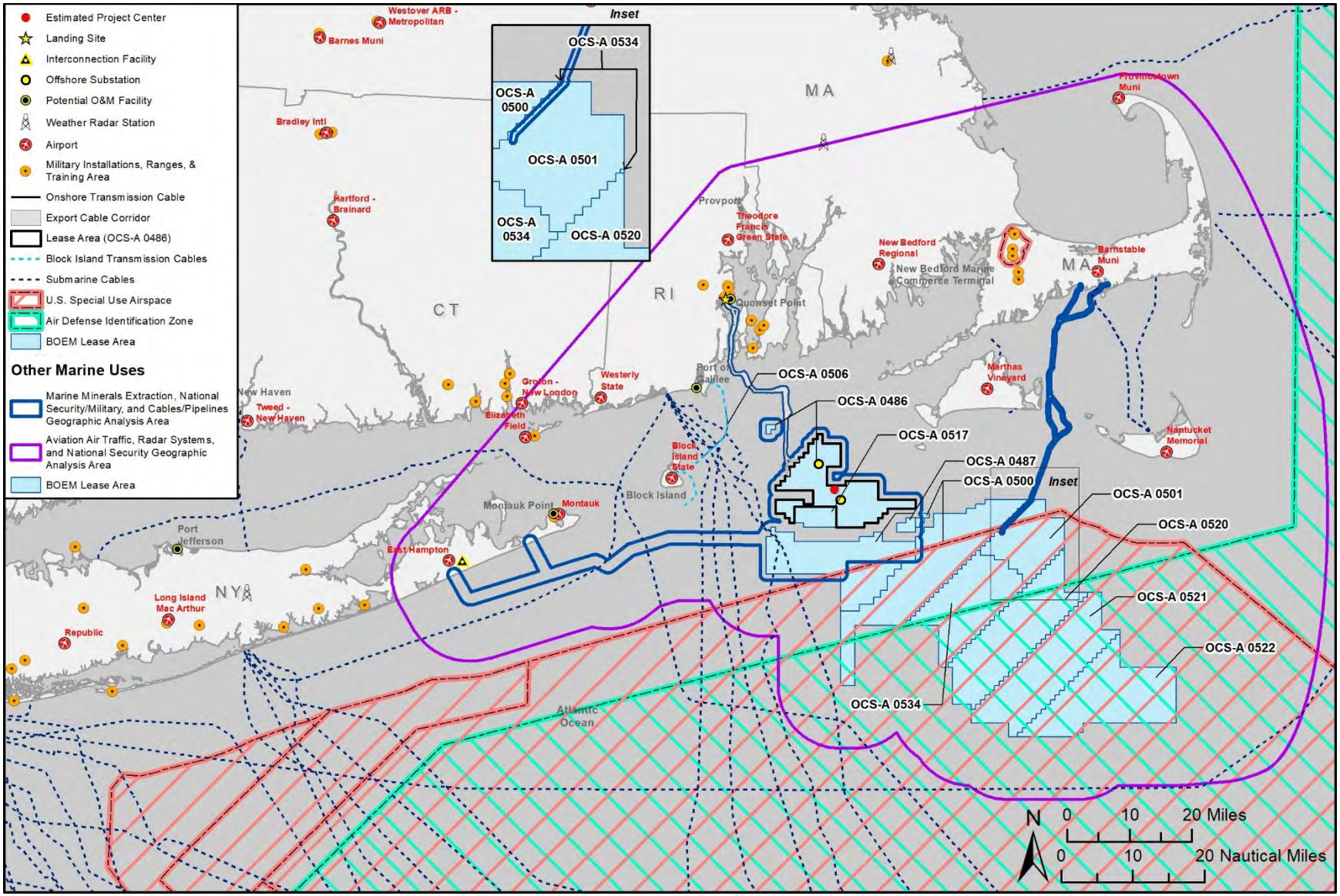

Figure 3.17-1. Geographic analysis areas for other uses.

3.17.1.1 Aviation and Air Traffic

Affected environment: Numerous public and private airports serve portions of New York, Rhode Island, and Massachusetts in the GAA. Major airports serving the region include Boston Logan International Airport, located approximately 100 miles northeast of the Project; T.F. Green Airport in Providence, Rhode Island, located approximately 50 miles north of the Project; and Montauk Airport in Montauk, New York, approximately 30 miles west of the RWF and 9 miles north of the offshore RWEC. The closest public airports to the Project are Nantucket Memorial Airport, approximately 55 miles east on Nantucket; Martha's Vineyard Airport, approximately 32 miles northeast on Martha's Vineyard; and Block Island State Airport, approximately 20 miles west on Block Island.

3.17.1.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential aviation and air traffic impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E2.

Aviation and air traffic: Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind activities would result in an increase in flight traffic for construction, ongoing wildlife surveys, and (search and rescue) SAR related to offshore wind project vessel traffic. Based on FAA (2022) data, the Proposed Action would conservatively add up to 7% to FAA-reported air traffic in the GAA for all aircraft types per year during the construction and decommissioning phases and 0.1% during O&M. It can be assumed, therefore, that other wind activities could result in similar air traffic increases, with future projects potentially overlapping in construction and/or decommissioning phases. These simplified assumptions are conservative, likely overestimate future air traffic, and do not account for aircraft concentration near New England region airports. Future offshore wind project air traffic would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on aviation and air traffic would be **negligible** adverse.

Light: Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks and optimize aviation safety. The addition of up to 1,036 lighted structures represents a substantive increase in the number and extent of aviation and navigation safety lighting systems operating within the GAA, an area that includes lighting from military, commercial, and construction vessels; vessel-related lighting such as buoys and towers; and onshore lighting from housing and ports. Therefore, the effects of light on aviation and air traffic under the No Action Alternative would be **minor** adverse.

Port utilization: There may be a minimal increase in vessel use at ports associated with the No Action Alternative. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action, which could result in delays and congestion at ports and lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in Section 3.17.1.1. Port improvements and construction activities in or near ports may require alteration of navigation

patterns at nearby airports. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. In addition, vessel traffic would be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: Future offshore wind development could add up to 1,036 structures to the offshore environment in the analysis area. WTGs could have maximum blade tip height of 1,171 feet (357 m) amsl. Addition of these structures would noticeably increase navigational complexity and change aircraft navigation patterns in the region around the leased areas offshore Massachusetts and Rhode Island, along transit routes between ports and construction sites, and locally around ports (see Port Utilization). These changes could compress lower-altitude aviation activity into more limited airspace in these areas, leading to airspace conflicts or congestion, and increasing collision risks for low-flying aircraft. However, open airspace around the RI and MA Lease Areas would still be available over the open ocean, and ports used for offshore WTG construction would be planned and developed to accommodate tall structures.

Open airspace around the Lease Areas would still exist after all foreseeable future offshore wind energy projects are built. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or minimize impacts on aviation activities and air traffic. For this reason, the effects of increased presence of structures to aviation and air traffic under the No Action Alternative are anticipated to be **minor** adverse.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, vessel traffic associated with future offshore wind projects located outside the Lease Area would result in increased vessel traffic in the RI/MA WEA and surrounding ports. The impacts of increased vessel traffic are discussed above under Port Utilization and Presence of Structures. Vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the increase in vessel traffic would not impact aviation and air traffic.

3.17.1.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. However, ongoing and future activities would have **minor** adverse impacts on aviation uses due to the presence of structures that introduce navigational complexities.

BOEM anticipates that impacts to aviation uses from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because any issues with aviation routes would be resolved through coordination with the FAA, as well as through implementation of navigational marking of structures according to FAA, USCG, and BOEM requirements and guidelines.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental

trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts for aviation uses.

3.17.1.2 Land-Based Radar

Affected environment: Several radar systems supporting commercial air traffic control, national defense, weather forecasting, and ocean condition observation operate near the Project (Westslope Consulting, LLC [Westslope] 2021). Six high-frequency airport surveillance (ASR) radar sites are located near the Project: Boston ASR-9, Falmouth ASR-8, Nantucket ASR-9, North Truro ARSR-4, Providence ASR-9, and Riverhead ARSR-4. The study area is beyond the instrumented range of the Boston ASR-9.

Three navigational aid sites are near the Project: Martha's Vineyard VOR/DME, the Providence VOR/DME, and Sandy Point VOR/DME. Two NEXRAD weather radar systems, the Boston WSR-88D and Brookhaven WSR-88D, are located near the Project.

There are 13 high-frequency radar sites located near the Project:

- Amagansett HF radar (operated by Rutgers University)
- Block Island Long Range HF radar (two radars operated by the University of Rhode Island and Rutgers University)
- Camp Varnum HF radar (operated by Woods Hole Oceanographic Institution)
- Horseneck Beach State Reservation HF radar (operated by Woods Hole Oceanographic Institution)
- Long Point Wildlife Refuge HF radar (operated by Woods Hole Oceanographic Institution)
- Martha's Vineyard HF radar
- Moriches HF radar (operated by Woods Hole Oceanographic Institution)
- Martha's Vineyard Coastal Observatory (MVCO) Meteorological Mast HF radar (operated by Woods Hole Oceanographic Institution)
- Nantucket Island HF radar (two radars operated by Rutgers University and Woods Hole Oceanographic Institution).
- Nauset HF radar (operated by the University of Massachusetts Dartmouth)
- Squibnocket Farms HF radar (operated by Woods Hole Oceanographic Institution)

3.17.1.2.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential radar impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E2.

Presence of structures: WTGs that are near or in direct line-of-sight to land-based radar systems can interfere with the radar signal causing shadows or clutter in the received signal. WTGs can also affect HF radar measurements of coastal ocean currents, oil spill tracking, and vessel drift tracking (BOEM 2020). Modeling completed on behalf of BOEM (2020) shows that small aircraft detection interference would

occur in the vicinity of each WTG. Construction of 1,036 structures in the RI/MA WEA could lead to long-term, **minor** adverse cumulative impacts to radar systems. While these structures would be sited at such a distance from existing and proposed land-based radar systems to minimize interference to most radar systems, event-based operational changes and modification of some land-based radar may be necessary. Event-based operational change may include wind farm curtailment agreements for BOEM lease areas that would cease wind farm operations when HF radar efficiency is essential, such as in the event of a severe hurricane/tropical storm or a large oil spill. BOEM (2020) is also currently developing a software upgrade for land-based HF radar to minimize impacts from offshore wind energy facilities. For vessel-based radar, the final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained vessel-based radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS would enable safe navigation in the GAA with minimal loss of radar detection.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, construction and operational vessel traffic from future offshore wind development outside the Lease Area is expected to increase. This could impact land-based radar by increasing the number of vessels in the analysis area. BOEM assumes that all offshore wind developments in the GAA would use the developer agreed upon 1 × 1–nm spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This would allow more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the No Action Alternative would be **minor** adverse.

3.17.1.2.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. However, ongoing and future activities would have **minor** adverse impacts on other uses due to the presence of structures that increase radar interference.

BOEM anticipates that impacts to radar would be **negligible** adverse for any individual ongoing and reasonably foreseeable activity other than offshore wind because any issues with radar systems would be resolved through coordination with the Department of Defense (DOD) or FAA.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in notable and **moderate** adverse impacts to radar systems due to combined WTG interference.

3.17.1.3 Military and National Security

Affected environment: The U.S. Navy, the USCG, and other military entities have numerous facilities in the region. Major onshore regional facilities include Naval Station Newport, the Naval Submarine Base New London, the Northeast Range Complex/Narragansett Bay Operation Area, Joint Base Cape Cod, and numerous USCG stations (Epsilon Associates, Inc. 2018). Onshore and offshore military use areas could have designated surface and subsurface boundaries and special use airspace. The Project is entirely within the Navy's Narragansett Operating Area in which national defense training exercises and system qualification tests are routinely conducted (MARCO 2021). This operating area extends approximately

100 miles south and 200 miles east of the Project. The Project is approximately 10 miles north of a Military Special Use Airspace (FK Facility Narragansett Bay) and 20 miles northeast of the closest submarine transit lanes. A DOD assessment of compatibility of offshore wind development with military assets and activities determined that potential conflicts exist in the area surrounding the Project and could require site-specific mitigation measures (OCM 2019).

3.17.1.3.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential military and national security impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Anchoring and new cable emplacement/maintenance: Up to 12,196 acres could be affected by anchoring and mooring activities and cable installation during offshore wind energy development within the analysis area. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be low because military vessels would largely travel in transit lanes, with the exception of SAR operations, and short term due to the limited amount of cable emplacement and maintenance expected from future offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on military and national security would be **negligible** adverse**.**

Aviation and air traffic: Future offshore wind activities could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects that in turn may increase the necessity for data collection and SAR operations. While the exact increase in future project-related flights is unknown, it is anticipated that future offshore wind-related flight traffic would be low and would be unlikely to affect military use of the area in SAR and data collection activities. Future offshore wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. With implementation of FAA-approved flight plans, impacts of the No Action Alternative on military and national security would be **negligible** adverse**.**

Light: Future offshore wind activities would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce the risk of military aircraft collisions. This increase in lighting would add to vessel and navigational lighting, as well as onshore housing and port lighting, in the GAA, which could have a negative impact on military and national. Therefore, the effects of light on military and national security under the No Action Alternative would be **minor** adverse.

Presence of structures: Installation of up to 1,036 structures in the RI/MA WEA, which currently supports only five offshore wind turbines associated with the BIWF, as well as several meteorological buoys (see Appendix E1), would impact military and national security vessels primarily through risk of allision and collision with stationary structures and other vessels. Vessels could directly allide with WTG foundations.

Vessel traffic would increase during project construction, and once the WTGs are operational, the artificial reef effect created by offshore structures could attract commercial and recreational fishing vessels. This would increase the risk of vessel collisions and increase navigation complexity, leading to potential use conflicts. In general, risks to military and national security vessels would increase over time as additional wind energy facilities are built.

Military and national security vessels could allide with WTG structures. However, deep-draft military vessels are not anticipated to transit outside of navigation channels unless necessary for SAR (of people or marine mammals) or nontypical operations. Allision risks for smaller vessels moving within or near offshore wind structures would be higher. However, these risks would be minimized by projects adhering to structural lighting requirements according to the USCG and BOEM, which would provide lighting at sea level. Additionally, allision would be further mitigated by following a fixed 1 × 1–nm WTG layout proposed by offshore wind leaseholders to facilitate safe navigation through the offshore wind energy Lease Areas (Geijerstam et al. 2019).

Additionally, risk of collision with recreational fishing vessels could indirectly increase as a result of the artificial reef effect around the offshore wind facility structures. New artificial reef effects could attract recreational fishing vessels farther offshore than currently occurs, adding to existing vessel traffic and subsequently increasing the risk of collision with military and national security vessels. Furthermore, an increase in recreational vessels in and around offshore wind projects could increase the demand for USCG SAR operations (of people or marine mammals).

In addition to allision or collision risks, military and national security vessels may be impacted by offshore wind energy structures by the need to change routes and navigate around both project footprints and project-associated vessels, particularly during the construction periods between 2021 and 2030. Furthermore, military and national security vessels may experience congestion and delays in port due to the increase in offshore wind facility vessels.

Military and national security aircraft would be impacted by the presence of tall equipment necessary for offshore wind facility construction, such as stationary lift vessels and cranes, which would increase navigational complexity in the area. Warning area W-105A measures approximately 23,000 square miles, with approximately 4% (approximately 1,000 square miles) overlaying the GAA (BOEM 2021). Military and national security operations conducted within W-105A would be impacted during construction and operation periods. However, it is assumed all offshore wind energy project operators would coordinate with relevant agencies during the COP development process to identify and minimize conflicts with military and national security operations.

Measures mitigating risks would include operational protocol to stop WTG rotation during SAR aircraft operations and implementation of FAA- and BOEM-recommended navigational lighting and marking to reduce the risk of aircraft collisions. Wind energy structures would be visible on military and national security vessel and aircraft radar. Nonetheless, the presence and layout of large numbers of WTGs could make it more difficult for SAR aircraft to perform operations (of people or marine mammals), leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents.

Navigational hazards would gradually be eliminated as structures are removed. Based on coordinating efforts and the anticipated mitigating measures discussed above, the overall impacts to military and national security uses are anticipated to be **moderate** adverse under the No Action Alternative.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to construction and decommissioning of future offshore wind facilities outside the Lease Area could lead to course changes of military and national security vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak in 2025 with as many as 276 vessels involved in construction of reasonably foreseeable projects. While construction periods of various wind energy facilities may be staggered, some overlap would result in a cumulative impact to traffic loads. Therefore, the effects of vessel traffic on military and national security under the No Action Alternative would be **minor** adverse.

3.17.1.3.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. However, ongoing and future activities would have **moderate** adverse impacts on military and national security uses due to the presence of structures that introduce navigational complexities and vessel traffic.

BOEM anticipates that impacts to military and national security uses from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because BOEM anticipates that any issues with the military or national security would be resolved through coordination with the DOD, as well as through implementation of navigational marking of structures according to FAA, USCG, and BOEM requirements and guidelines.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts for military and national security uses.

3.17.1.4 NOAA's Scientific Research and Surveys (see section in main EIS)

3.17.1.5 Undersea Cables

Affected environment: There are existing submarine cables that run through the regional waters. Most pass through Green Hill, Rhode Island. In addition, there are NOAA nautical chart cable and pipeline areas that denote where such infrastructure may be located. The existence of these areas does not necessarily mean that actual cables or pipeline are present (BOEM 2013). Other than cables for other offshore wind projects, BOEM has not identified any publicly noticed plans for additional submarine cables or pipelines; therefore, no new cable installation is reasonably foreseeable for the purposes of this EIS.

3.17.1.5.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential undersea cable impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E2.

Presence of structures: Up to 1,036 structures could be installed between 2021 and 2030 in the RI/MA WEA as part of future offshore wind energy project infrastructure. The presence of future offshore wind energy structures could preclude future submarine cable placement, as discussed in Appendix E2 in "Anchoring and new cable emplacement/maintenance." Installed WTGs and OSSs and stationary lift vessels used during construction that are located near existing submarine cables could pose allision risks and navigational hazards to vessels conducting maintenance activities on these cables. The future development of multiple wind energy projects could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from ongoing and planned actions are anticipated to be localized long term **negligible** adverse because impacts can be avoided by routing design and standard cable protection techniques.

Vessel traffic: Although no future non–offshore wind stationary structures were identified within the Lease Area, increased vessel traffic due to construction and installation of future offshore wind activities located outside the Lease Area could interfere with vessels used to install or maintain existing and future undersea cables. Increased vessel traffic due to Project construction and installation, O&M, and decommissioning could lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Therefore, the effects of vessel traffic on undersea cables under the No Action Alternative would be **negligible** adverse**.**

3.17.1.5.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. Ongoing and future activities would have **negligible** adverse impacts on undersea cables due to the presence of offshore wind energy cables or structures that could preclude future submarine cable placement and vessel traffic.

BOEM anticipates that impacts to undersea cables from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** adverse because BOEM anticipates that cables could be easily crossed by vessels and existing cables require minimal maintenance.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **negligible** adverse impacts on undersea cables.

3.17.2 Environmental Consequences

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

The analysis presented in this section considers the impacts resulting from the maximum design scenario under the project design envelope (PDE) approach developed by BOEM to support offshore wind project development (Rowe et al. 2017). The maximum design size specifications defined in Appendix D, Table D-1, are PDE parameters used to conduct this analysis.

The following design parameters would result in different impacts relative to those generated by the design elements considered under the PDE:

- The selection of lower capacity WTG designs would reduce the total WTG height from 873 to as low as 648 feet, reducing impacts to aviation and air traffic, land-based radar, and military and national security.

See Appendix E1 for a summary of IPFs analyzed for other uses across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1, Tables E2-15 to E2-21. Other uses subsections (NOAA's scientific research and surveys) are discussed in the main EIS.

Table 3.17-1 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on other uses. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. The overall effect determination for each alternative is **minor** adverse impacts for aviation and air traffic; **moderate** adverse for land-based radar; **moderate** adverse for military uses; and **negligible** adverse for undersea cables.

Table 3.17-1. Alternative Comparison Summary for Other Uses

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Aviation and Air Traffic						
Aviation and air traffic	**Offshore:** Future offshore wind activities without the Proposed Action could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. With implementation of FAA-approved flight plans, however, impacts of the No Action Alternative on aviation and air traffic would be **negligible** adverse.	**Offshore:** The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. Additionally, all aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **minor** adverse. Helicopter flights for Project O&M would represent a 0.1% increase in annual helicopter flight hours and a 0.01% increase in general aviation hours in the GAA. When estimation uncertainty is considered, this represents a **negligible** adverse effect on general aviation air traffic. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **negligible** adverse impacts on aviation and air traffic.	**Offshore:** This alternative could require fewer construction and O&M–related helicopter trips due to the reduction in the number of offshore elements, incrementally reducing the number of construction-related helicopter trips. While Alternatives C to F could result in slightly reduced air traffic, the effects of this IPF on aviation and air traffic under each alternative would otherwise be similar to those described for the Proposed Action: **minor** adverse for construction and **negligible** adverse for O&M and cumulative impacts.			
Light	**Offshore:** Future offshore wind activities without the Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. The addition of up to 1,036 lighted structures represents a small increase in the combined vessel, navigation, housing, and port lights within the GAA; therefore, the effects of light on aviation and air traffic under the No Action Alternative would be **minor** adverse.	**Offshore:** During construction and installation and O&M, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircraft, similar to other large-scale sea surface activity. Therefore, impacts to aviation and air traffic would be **negligible** adverse. BOEM estimates a maximum cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidelines to minimize collision and allision risks. WTGs would also be visible on aircraft radar. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would have a **negligible** adverse impact on aviation and air traffic.	**Offshore:** Under Alternatives C through F, fewer lighted WTG locations would be approved by BOEM when compared to the maximum-case scenario under the Proposed Action. However, this slight reduction in lighting would not be expected to measurably reduce aviation and air traffic impacts compared to those impacts described under the Proposed Action. Therefore, the impact on aviation and air traffic under each alternative would be **negligible** adverse for all Project phases.			
	Onshore: See offshore analysis.	**Onshore:** Operational lighting onshore would be limited to the OnSS and ICF, which would have minimal yard lighting and task lighting. This lighting is minimal and would not result in impacts to aviation and air traffic. Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of light on aviation and air traffic under the Proposed Action would be **negligible** adverse.	**Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Port utilization	**Offshore:** Port improvements and construction activities in or near ports may also require alteration of navigation patterns at nearby airports. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.	**Offshore:** Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports. However, vessel traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.	**Offshore:** Alternatives C through F would require a shorter construction duration, a smaller construction footprint, and fewer offshore structures. While Alternatives C through F could result in a slight reduction in port utilization, the effects of this IPF on aviation and air traffic under Alternatives C through F would otherwise be similar to those described for the Proposed Action and would therefore be **negligible** adverse for all Project phases**.**			
	Onshore: See offshore analysis.	**Onshore:** Ports would be primarily used during construction and installation of the Proposed Action, as ports would be used for staging WTGs and mobilizing construction work. Decommissioning would have impacts similar to those during Project construction. There would be no impacts to aviation and air traffic from O&M and decommissioning of the Proposed Action; therefore, impacts would be **negligible** adverse. Cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on aviation and air traffic.	**Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** to **minor** adverse.			
Presence of structures	**Offshore:** Future offshore wind development could add up to 1,036 structures to the offshore environment in the GAA. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or minimize impacts on aviation activities and air traffic. For this reason, the effects of the increased presence of structures to aviation and air traffic under the No Action Alternative are anticipated to be **minor** adverse.	**Offshore:** The Proposed Action would add up to 100 WTGs with maximum blade tip heights of up to 853 feet amsl. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational time frame. However, more than 90% of existing air traffic in the GAA would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021). Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse. BOEM estimates a cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic.	**Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM, which would result in a noticeably smaller offshore impact compared to the maximum case under the Proposed Action. The effects of this IPF would be the same or slightly reduced to those described for the Proposed Action and would therefore be **negligible** adverse for construction and O&M, and **minor** adverse for cumulative impacts.			
	Onshore: See offshore analysis.	**Onshore:** The O&M of onshore structures to support the Proposed Action would not impact aviation and air traffic. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.	**Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Vessel traffic	**Offshore:** Vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the slight increase in vessel traffic would not impact aviation and air traffic.	**Offshore:** Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Construction of offshore structures would incrementally noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports, due to increased vessel traffic. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would occur over a short period of time. Vessel traffic associated with the Proposed Action and reasonably foreseeable future actions would result in increased vessel traffic in the GAA. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in a **minor** adverse impact on aviation and air traffic.	**Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM. Construction and installation vessel traffic may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts.			
	Onshore: See offshore analysis.	**Onshore:** Onshore vehicle traffic may increase as a result of O&M and decommissioning of the Proposed Action but would not impact aviation and air traffic because aviation and air traffic uses are generally spatially separate from vehicular traffic and occur in different locations. Therefore, this IPF would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic.	**Onshore:** Alternatives C through F would consist of the same onshore facilities and activities as those planned under the Proposed Action. Therefore, onshore impacts to aviation and air traffic from Project activities would be **negligible** adverse.			
Military and National Security (including search and rescue)						
Anchoring and new cable emplacement/ maintenance	**Offshore:** Offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the GAA. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited as cable emplacement vessels would be restricted to emplacement corridors and activities would be of short duration for future offshore wind activities. Therefore, the effects of anchoring and new cable emplacement and maintenance under the No Action Alternative on military and national security would be **negligible** adverse.	**Offshore:** Anchoring and mooring activities would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the GAA. However, the impacts are expected to be limited as cable emplacement vessels would be restricted to emplacement corridors and activities would be of short duration during construction and installation of offshore Project elements. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on military and national security would be **negligible** adverse. Project activities combined with reasonably foreseeable activities would result in a substantive increase in vessel traffic during cable emplacement and maintenance, contributing to a **minor** adverse impact on military and national security.	**Offshore:** Because the impact would be slightly reduced regardless of the configuration selected, all offshore impacts under Alternatives C through F would be slightly reduced compared to the Proposed Action. The effects of this IPF would therefore be **negligible** to **minor** adverse.			
Aviation and air traffic	**Offshore:** Future offshore wind activities could result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. With implementation of FAA-approved flight plans, however,	**Offshore:** Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. Therefore, the effects of this IPF on military and national security under the Proposed Action would be **minor** adverse.	**Offshore:** Alternatives C through F would require fewer construction-related helicopter trips due to the reduction in the number of offshore elements. However, the effects of this IPF on military and national security would otherwise be similar to those described for the Proposed Action: **negligible** adverse for O&M and **minor** adverse for construction and cumulative impacts.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	impacts of the No Action Alternative on military and national security would be **negligible** adverse.	O&M of the Proposed Action would result in a 0.01% increase in general aviation in the GAA. Therefore, the effects of this IPF on military and national security would be **negligible** adverse. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on military and national security.				
Light	**Offshore:** Future offshore wind activities would result in an increase in permanent aviation warning lighting on WTGs offshore, which would add to vessel and navigational lighting, as well as onshore housing and port lighting, in the GAA, which could have a negative impact on military and national security. Therefore, the effects of light on military and national security under the No Action Alternative would be **minor** adverse.	**Offshore:** The Proposed Action would result in an increase in temporary construction aviation warning lighting on WTGs offshore, which could have **minor** adverse impacts. The O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on WTGs offshore until decommissioning is complete. The addition of permanent lighting would be an ongoing impact; therefore, the effects of light on military and national security under the Proposed Action would be **minor** adverse. The Project, with reasonably foreseeable future actions, could result in the addition of up to 1,138 lighted structures in the GAA. Therefore, the cumulative impacts of light on military and national security would be **minor** adverse.	**Offshore:** Under this alternative, fewer lighted WTG locations would be approved by BOEM. While Alternatives C through F could result in a reduction in construction lighting, the effects of this IPF on military and national security uses would otherwise be similar to those described for the Proposed Action. Therefore, the impact on military and national security uses would be **minor** adverse.			
Presence of structures	**Offshore:** Installation of up to 1,036 structures in the RI/MA WEA would impact military and national security vessels primarily through risk of allision and collision with stationary structures and other vessels. Based on coordinating efforts and anticipated mitigating measures, however, the overall impacts to military and national security uses are anticipated to be **moderate** adverse.	**Offshore:** Construction of the Proposed Action would increase the risk of collisions and allisions for military and national security vessels or aircraft within the WEA. Structures would be marked as a navigational hazard per FAA, BOEM, and USCG requirements, and risk would be consistent within the 35-year operational period. The Project's 1 × 1–nm spacing reduces some of the risk of collisions and allisions. Therefore, the Project would have **minor** to **moderate** adverse impacts on military operations and national security. The presence of additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. Therefore, the Project would have **minor** adverse O&M impacts on military operations and national security. The Proposed Action structures represent a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would be **moderate** adverse.	**Offshore:** While the offshore footprint would be reduced under all configurations, the effects of this IPF on military and national security uses under Alternatives C through F would otherwise be similar to those described for the Proposed Action. Therefore, the impact of this IPF on military and national security uses would be **minor** to **moderate** adverse.			
Vessel traffic	**Offshore:** Increased vessel traffic due to construction and decommissioning of future offshore wind facilities could lead to course changes of military and national security vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Therefore, the effects of vessel traffic on	**Offshore:** Increased vessel traffic could impact military and national security uses by increasing the number of vessels in the GAA. The RWF's proposed 1 × 1–nm spacing would result in more space for vessels to navigate and would help reduce conflicts with military vessels. As a result,	**Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. While the offshore footprint would be reduced under all configurations, vessel traffic is expected to remain at similar levels as vessel traffic under the Project. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	military and national security under the No Action Alternative would be **minor** adverse.	the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse. The Proposed Action represents approximately 2% of typical vessel traffic in the GAA. Therefore, the Proposed Action would result in a **minor** adverse impact for vessel traffic on military and national security.	this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on military and national security would be **minor** adverse.			
Land-Based Radar						
Presence of structures	**Offshore:** Construction of 1,036 structures in the RI/MA WEA could lead to long-term, **minor** adverse impacts to radar systems. However, these structures would be sited at such a distance from existing and proposed land-based radar systems to minimize interference to most radar systems. The Final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection.	**Offshore:** Construction and installation and O&M of offshore Project components could result in impacts to land-based radar by introducing potential obstacles to radar coverage in the RI/MA WEA. The final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. Therefore, the offshore Project components would result in **negligible** adverse impacts to land-based radar. The Proposed Action and past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land-based radar.	**Offshore:** Under Alternatives C through F, fewer WTG locations would be approved by BOEM. Because the impact would be slightly reduced regardless of configuration selected, all offshore impacts would be slightly reduced compared to the Proposed Action and would therefore be **negligible** to **minor** adverse. Radar line of sight backscatter effects may be altered or slightly reduced depending on which alternative configuration is selected, as all alternative configurations would reduce the number of WTGs. This could result in slightly reduced impacts to land-based radar at Falmouth ASR-8, Nantucket ASR-9, and the Providence ASR-9.			
Vessel traffic	**Offshore:** Construction and operational vessel traffic from future offshore wind development is expected to increase. This could impact land-based radar by increasing the number of vessels in the analysis area. BOEM assumes that all offshore wind developments in the GAA would use the developer agreed upon 1 × 1–nm spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This would allow more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the No Action Alternative would be **minor** adverse.	**Offshore:** There would be increased construction and operational vessel and O&M traffic from the Proposed Action. This could impact land-based radar by increasing the number of vessels in the analysis area. The RWF's proposed 1 × 1–nm spacing would provide more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse. Reasonably foreseeable activities are expected to also generate vessel traffic that would increase the number of vessels in the RI/MA WEA. EPMs would reduce the cumulative impacts of increased vessel traffic to a **minor** adverse level.	**Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint under the Habitat Alternative. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on land-based radar would be **negligible** adverse for construction and O&M and **minor** adverse for cumulative impacts.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Undersea Cables						
Presence of structures	**Offshore:** The future development of multiple wind energy projects could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in the context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from ongoing and planned actions are anticipated to be localized long term **negligible** because impacts can be avoided by routing design and standard cable protection techniques.	**Offshore:** The presence of the Project could preclude future submarine cable placement in the RWF and RWEC, although there are no future cables identified for location within this area. The impacts from foundation construction would be minor adverse while the installation of the RWECs would be **negligible** adverse. Once the foundations are constructed, impacts from foundation O&M and decommissioning would be **minor** adverse and O&M and decommissioning of RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables would be **minor** adverse. BOEM estimates a cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. While these structures could increase the routing complexity of undersea cables associated, cable crossing can be protected using standard cable protections. The impacts from foundation construction from reasonably foreseeable future actions would be **negligible** adverse because impacts can be avoided by routing design and standard cable protection techniques.	**Offshore:** Because the impact would be slightly reduced regardless of configuration selected, all offshore impacts under Alternatives C through F would be slightly reduced compared to the Proposed Action. The effects of this IPF would be the same or slightly reduced relative to those described for the Proposed Action and would therefore be **negligible to minor** adverse for construction and O&M and **negligible** adverse for cumulative impacts.			
Vessel traffic	**Offshore:** Increased vessel traffic due to construction and installation of future offshore wind activities could interfere with vessels used to install or maintain existing and future undersea cables, or lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. However, given the infrequency of required maintenance at any given location along a cable route, the effects of vessel traffic on undersea cables under the No Action Alternative would be **negligible** adverse.	**Offshore:** Increased vessel traffic due to construction and installation of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Additionally, there would be increased risk for allisions with vessels used for construction and O&M of undersea cables. These effects are expected to be minimal and short term. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse. The cumulative impact from vessel traffic on undersea cables would be **negligible** adverse.	**Offshore:** Vessel traffic associated with Alternatives C through F may result in slightly reduced vessel traffic in the Lease Area and around ports given the smaller offshore footprint. Reduced navigational complexity combined with a smaller construction footprint and fewer offshore structures would result in the effects of this IPF being the same or slightly reduced relative to those described for the Proposed Action. Therefore, impacts on undersea cables would be **negligible** adverse.			

3.17.2.2 Alternative B: Impacts of the Proposed Action on Aviation and Air Traffic

3.17.2.2.1 Construction and Installation

Offshore Activities and Facilities

Aviation and air traffic: The Proposed Action would result in an increase in air traffic related to construction and installation of offshore Project elements. Project construction would result in one to two helicopter flights to and from the Project area per day for construction of the foundations. Helicopters would also be used for additional crew transfers during construction activities. Estimated helicopter use for the RWF during the construction phase is estimated to be less than 200 helicopter trips and approximately 8,832 hours of flight time over the 2-year construction period (COP Appendix T [Tech Environmental 2021]). Based on national aviation statistics (FAA 2020), general aviation aircraft logged an estimated 792,266 hours of total flight in the FAA's New England Region in 2019. Extrapolating from nationwide statistics, helicopters would account for approximately 93,000 hours of the New England Region total. The Proposed Action would require a total estimated 8,832 hours of helicopter flight time for Project construction and installation, or approximately 4,416 flight hours per year, over the 2-year construction period of the Project. The GAA represents approximately 8% of the 160,000 square miles of airspace in the FAA New England Region. Applying this proportion, helicopter flights for Project construction and installation would represent a 63% increase in annual helicopter flight hours and a 7% increase in general aviation hours in the GAA. The effect determination is based on the 7% increase in general aviation hours in the GAA, as the increase in helicopter hours specifically would not have a direct impact on aviation and air traffic compared to the general overall increase in aircraft in the GAA. When estimation uncertainty is considered, the 7% increase in Project-related air traffic over the 2-year construction period represents a **minor** adverse effect on general aviation air traffic. A helicopter route plan would be developed to meet industry guidelines and best practices in accordance with FAA guidance. Additionally, all aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **minor** adverse.

Lighting: During construction and installation, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircrafts, similar to other large-scale sea surface activity. Therefore, impacts to aviation and air traffic would be **negligible** adverse.

Port utilization: Various ports would be improved to support the Proposed Action (see Section 3.14). These improvements would occur within the boundaries of existing port facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. The number of construction vessels would increase due to future offshore wind activities without the Proposed Action which could result in delays and congestion at ports which could lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in Section 3.17.1. Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports; however, port improvements are anticipated to occur under the No Action Alternative to support regional offshore wind energy industry development. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed. However, vessel traffic would also be spread among multiple ports to ensure that sufficient

capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: The Proposed Action would add up to 100 WTGs with maximum blade tip heights of up to 853 feet amsl. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational timeframe. However, more than 90% of existing air traffic in the analysis area would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021).

For the air traffic that occurs at altitudes that could be impacted by the presence of WTGs, the FAA conducts aeronautical studies to ensure that proposed structures do not have an effect on air navigation safety and the ability of aircraft to efficiently use navigable airspace. Proposed structures are considered as having an adverse effect if they exceed obstacle clearance surfaces.

An air traffic flow analysis for the Project was completed (Capitol Airspace Group 2020). WTGs at a height of 873 ASL could affect Visual Flight Rules (VFR) routes, requiring an increase to a Block Island State Airport (BID) instrument approach minimum altitude, Boston Consolidated (A90) Terminal Radar Approach Control (TRACON) minimum vectoring altitudes (MVAs), and Providence (PVD) TRACON MVAs.

However, historical air traffic data indicates that 873-foot ASL wind turbines would not affect any regularly used VFR routes. Additionally, historical air traffic data indicates that the required changes to the BID instrument approach procedure, A90 TRACON MVA sectors and PVD TRACON MVA sectors, should not affect a significant volume of operations. As a result of these findings, it possible that the FAA would be willing to increase the affected altitudes in order to accommodate wind development up to 873 feet ASL. These mitigation options are available and subject to FAA approval. Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse.

Vessel traffic: Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Construction of offshore structures would noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports due to increased vessel traffic. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would occur over a short period of time.

3.17.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Aviation and air traffic: The Proposed Action would result in an increase in air traffic related to O&M and decommissioning of the Proposed Action. A hoist-equipped helicopter may be used to support O&M (vhb 2022). Table 3.5-5 in the COP provides a summary of O&M support vessels that are currently being considered to support Project O&M. The type and number of vessels and helicopters would vary over the operational lifetime of the Project.

During O&M, helicopters would be used to provide supplemental means of access when vessel access is not practical or desirable. Flights would be currently restricted to daylight operations when visibility is good. Helicopters would be used for two different purposes to support O&M:

- Helicopter hoist operations: An integrated helicopter hoist platform located on the roof of each WTG nacelle would provide access for O&M. SOVs and the OSSs may also be fitted with helicopter hoist platforms. The purpose of this effort is primarily for transport and transfer of technical personnel and equipment on to/from the WTGs via hoist to the nacelle but can also be conducted for transport and transfer of personnel and equipment to offshore installations that do not have a helideck. This is the most common means of access in the O&M phase and is typically used to perform minor repairs and restarts.
- Transport and transfer operations: Transport helicopter operations are flights from an onshore airport or heliport to an offshore installation or vessel with a helideck and back. Transfer helicopter operations are flights within the WEA from an offshore installation or vessel with a helideck to another, and back.

All aviation operations, including flying routes and altitude, would be aligned with relevant stakeholders, such as the FAA. It is anticipated that there would be up to 800 helicopter trips and a total flight time of up to 252 hours of flight time for O&M of the Project (Tech Environmental 2021). Based on national aviation statistics (FAA 2020), general aviation aircraft logged an estimated 792,266 hours of total flight in the FAA's New England Region in 2019. Extrapolating from nationwide statistics, helicopters would account for approximately 93,000 hours of the New England Region total. The Proposed Action would require an estimated 252 hours of helicopter flight time for project O&M, or approximately 8.4 flight hours per year, over the 35-year operating period of the Project. The GAA represents approximately 8% of the 160,000 square miles of airspace in the FAA New England Region. Applying this proportion, helicopter flights for Project O&M would represent a 0.1% increase in annual helicopter flight hours and a 0.01% increase in general aviation hours in the GAA. When estimation uncertainty is considered, this represents a **negligible** adverse effect on general aviation air traffic. On this basis, the effects of Project-related aviation and air traffic on aviation and air traffic under the Proposed Action would be **negligible** adverse.

Light: During O&M, WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircrafts, similar to other large-scale sea surface activity. Decommissioning would have impacts similar to those during Project construction. Therefore, impacts to aviation and air traffic would be **negligible** adverse**.**

Port utilization: Various ports could be improved to support the Proposed Action (see Section 3.14). These improvements would likely occur within the boundaries of existing port facilities, similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Therefore, port utilization is expected to have a **negligible** adverse effect on aviation and air traffic.

Presence of structures: The Proposed Action would add up to 100 WTGs and two OSSs having maximum blade tip and structure heights of up to 853 feet and 180 feet amsl, respectively. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational time frame. However, more than 90% of existing air traffic in the analysis area would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021). An air traffic flow analysis completed by Capitol Airspace found that it is possible that the FAA would be willing to increase the affected altitudes in order to accommodate wind development up to 873 feet above sea level (ASL) (Capitol Airspace Group 2020). Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of the presence of structures on aviation and air traffic under the Proposed Action would be **negligible** adverse**.**

Vessel traffic: Vessel traffic associated with the Proposed Action would result in increased vessel traffic in the Lease Area and around ports. Addition of offshore structures would noticeably increase navigational complexity along transit routes between ports and construction sites, and locally around ports. Increased vessel traffic is expected to have a **negligible** adverse effect on aviation and air traffic because vessel traffic would be spread throughout a large geographic area and would be short term.

Onshore Activities and Facilities

Light: Operational lighting onshore would be limited to the OnSS and ICF, which would have minimal yard lighting and task lighting (see Section 3.14). This lighting is minimal and would not result in impacts to aviation and air traffic. Decommissioning would have impacts similar to those during Project construction. Therefore, the effects of light on aviation and air traffic under the Proposed Action would be **negligible** adverse**.**

Port utilization: Ports would be primarily used during construction and installation of the Proposed Action, as ports would be used for staging WTGs and for mobilizing construction work. Decommissioning would have impacts similar to those during Project construction. There would be no impacts to aviation and air traffic from O&M and decommissioning of the Proposed Action; therefore, impacts would be **negligible** adverse**.**

Presence of structures: The O&M of onshore structures to support the Proposed Action would not impact aviation and air traffic. This IPF would result in a **negligible** adverse impact because there would be no effect on this resource.

Vehicle traffic: Onshore vehicle traffic in and around ports and onshore facilities may increase as a result of O&M and decommissioning of the Proposed Action. Project-related vehicle traffic would not impact aviation and air traffic because these uses are generally spatially separate from vehicular traffic and occur in different locations. Therefore, this IPF would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic.

3.17.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Aviation and air traffic: The Proposed Action would result in approximately 4,416 construction flight hours per year during construction and installation over a 2-year construction period, then the flight hours

would significantly decrease to approximately 8.4 flight hours per year during O&M and decommissioning of the RWF. During construction and installation this results in a 7% increase in general aviation air traffic in the GAA and during O&M and decommissioning this results in a 0.01% increase in general aviation air traffic in the GAA. In total, there would be an average of 303 flight hours per year over 32 years (2-year construction period and up to 35-year operational period). This represents a 4% yearly increase in helicopter flight hours in the GAA and a 1% yearly increase in general aviation flight hours. Future offshore wind activities without the Proposed Action could also result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning of future wind projects. While the exact increase in future Project-related flights is unknown, it is anticipated that reasonably foreseeable future wind activities would also result in increases in flight traffic similar in scale to the Proposed Action. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **negligible** adverse impacts on aviation and air traffic.

Light: The Proposed Action would add permanent lighting for up to 100 WTGs and 2 OSSs for the duration of the Project. BOEM estimates a maximum cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidelines to minimize collision and allision risks. WTGs would also be visible on aircraft radar. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action Alternative and would have a **negligible** adverse impact on aviation and air traffic.

Port utilization: The Proposed Action combined with reasonably foreseeable future actions could result in a very minimal increase in vessel use at ports, most of which would be during construction and decommissioning of the Project. The number of construction vessels would increase due to both the Proposed Action and reasonably foreseeable future actions, which could result in delays and congestion at ports and lead to potential conflicts with air traffic due to increased activity in the vicinity of the airports listed in the Affected Environment. Port improvements and construction activities in or near ports may require alteration of navigation patterns at nearby airports. Navigational hazards and collision risks at ports and in transit routes would be reduced as construction is completed, and all navigation hazards and collision risks would be gradually eliminated during decommissioning as offshore WTGs are removed. However, vessel traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in a **negligible** adverse impact on aviation and air traffic.

Presence of structures: The Proposed Action structures represent a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative. BOEM estimates a cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. WTGs could have maximum blade tip height of 1,171 feet amsl.

Addition of these structures would noticeably increase navigational complexity and change aircraft navigation patterns in the region around the leased areas offshore Massachusetts and Rhode Island, along transit routes between ports and construction sites, and locally around ports (see Port utilization). These changes could compress lower-altitude aviation activity into more limited airspace in these areas, leading to airspace conflicts or congestion, and increasing collision risks for low-flying aircraft. However, open airspace around the GAA would still be available over the open ocean, and ports used for offshore WTG construction would be planned and developed to accommodate tall structures.

Open airspace would continue to exist around all Lease Areas after the Proposed Action and reasonably foreseeable future offshore wind energy projects are built. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction and installation, O&M, and decommissioning process to avoid or minimize impacts on aviation activities and air traffic. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic.

Vessel traffic: Vessel traffic associated with the Proposed Action and reasonably foreseeable future actions would result in increased vessel traffic in the GAA. The impacts of increased vessel traffic are discussed above under Port Utilization and Presence of Structures. Vessel traffic would be spread throughout a large geographic area, and while construction time frames may overlap, it is anticipated that the increase in vessel traffic would not impact aviation and air traffic. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in a **minor** adverse impact on aviation and air traffic.

Onshore Activities and Facilities

Lighting: It is not anticipated that any of the onshore Project components for the Proposed Action or reasonably foreseeable future actions would require FAA-compliant lighting. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable Project impacts would result in **negligible** adverse impacts on aviation and air traffic from light.

Port utilization: WTG components located at staging ports could result in issuance of notices to airmen, causing some aircraft to reroute. WTG components would be in staging ports for brief periods. It is expected that reasonably foreseeable future actions would have similar port utilization impacts that account for construction and installation, O&M, and decommissioning of future actions. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse on aviation and air traffic.

Presence of structures: The construction and installation, O&M, and decommissioning of the Proposed Action and other reasonably foreseeable onshore structures would not contribute to cumulative impacts on aviation and aircraft because onshore structures are sited in industrial and commercial areas away from aviation uses. The presence of onshore structures would also be limited to O&M facilities, the OnSS, and ICFs that are similar in nature to surrounding land uses and would not create impacts on aviation uses. It is expected that reasonably foreseeable future actions would have similar structure impacts that account for construction and installation, O&M, and decommissioning of future actions. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** adverse on aviation and air traffic.

Vehicle traffic: Onshore vehicle traffic surrounding ports and onshore facilities may increase as a result of the Proposed Action, but it would not impact aviation and air traffic because these uses are spatially separate from vehicular traffic and occur in different locations. Additionally, it is anticipated that vehicular traffic would also increase at onshore wind facilities and port facilities as a result of reasonably foreseeable future actions. It is expected that vehicular traffic increases would be commensurate with the impacts expected for the Proposed Action in scale, intensity, and duration. Therefore, the Proposed Action combined with reasonably foreseeable future actions would result in a **negligible** adverse impact because minimal increases in vehicle traffic would not impact aviation and air traffic.

3.17.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing aviation and air traffic occurring in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for aviation and air traffic. BOEM anticipates the impacts resulting from the Proposed Action alone would result in **negligible** adverse impacts on aviation and air traffic that would primarily be caused by installation of WTGs in the GAA due to potential changes in navigational patterns.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **minor** adverse impacts for aviation and air traffic.

3.17.2.3 Alternative B: Impacts of the Proposed Action on Land-Based Radar

3.17.2.3.1 Construction and Installation

Offshore Activities and Facilities

Presence of structures: Construction and installation of offshore Project components could result in impacts to land-based radar by introducing potential obstacles to radar coverage in the RI/MA WEA. These impacts would be less than those identified for Project O&M and discussed in Section 3.17.2.3.2 Therefore, the construction and installation of offshore Project components would result in **negligible** adverse impacts to land-based radar.

Vessel traffic: There would be increased construction and operational vessel traffic from the Proposed Action, but the increase would not represent a substantial change to vessel traffic volume, which includes numerous ports and extensive marine traffic related to shipping, fishing, and recreation. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse.

3.17.2.3.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Presence of structures: WTGs that are near or in direct line of sight to land-based radar systems can interfere with the radar signal by causing shadows or clutter in the received signal. Construction of 102 structures in the Lease Area could lead to impacts to land-based radar systems identified in Appendix S2 of the COP. The RLOS analysis (Westslope 2021) determined the following radar impacts by the presence of WTGs at a height of 873 amsl:

- For the Falmouth ASR-8, wind turbines in the northeastern two-thirds of the study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet above ground level (AGL).[2]
- For the Nantucket ASR-9, wind turbines in the eastern one-half of the study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet AGL.
- For the Providence ASR-9, wind turbines in the entire study area would be within the line of sight of and would interfere with this radar site at a blade-tip height of 873 feet AGL.
- For the North Truro ARSR-4 and the Riverhead ARSR-4, wind turbines in the study area would not be within the line of sight of and would not interfere with these radar sites at a blade-tip height of 873 feet AGL.
- The EWR LOS analysis for the Cape Cod AFS EWR shows that wind turbines in the majority of the study area will be within the line of sight of this radar site and could have a significant impact on this early warning radar at a blade-tip height of 873 feet AGL.

For the Falmouth ASR-8, Nantucket ASR-9, and the Providence ASR-9, without mitigation, the radar effects due to clutter could include a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines within the radar line of sight in the study area. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of wind turbines within the line of sight in the study area.

The HF radar LOS analyses show the following:

- For the Amagansett HF radar, wind turbines in the western corners of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Block Island Long Range HF radar, Camp Varnum HF radar, Horseneck Beach State Reservation HF radar, Long Point Wildlife Refuge HF radar, and the Martha's Vineyard HF radar, wind turbines in the entire study area would be within the line of sight of these radar sites at a blade-tip height of 873 feet AGL.
- For the Block Island Standard Range HF radar, wind turbines in the western two-thirds of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the MVCO Meteorological Mast HF radar, wind turbines in the eastern one-fifth of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Nantucket HF radar, wind turbines in the eastern one-third of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.
- For the Squibnocket Farms HF radar, wind turbines in the eastern one-fifth and along the northern edges of the study area would be within the line of sight of this radar site at a blade-tip height of 873 feet AGL.

[2] Height AGL used by Westslope (2021) is equivalent to height amsl as defined in Section 2.1.2.1, Table 2.1-1.

- For the Moriches HF radar, Nantucket Island HF radar, and the Nauset HF radar, wind turbines in the study area would not be within the line of sight of these radar sites at a blade-tip height of 873 feet AGL. Although wind turbines in the study area would not be within the line of sight of these radar sites, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Westslope (2021) concluded that, without mitigation, the Proposed Action could result in measurable effects on radar systems within their study area, including clutter in the vicinity of line-of-sight turbines and possibly in the vicinity of wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. These impacts could affect the following radar systems; the Amagansett HF radar, Block Island Long Range HF radar, Block Island Standard Range HF radar, Camp Varnum HF radar, Horseneck Beach State Reservation HF radar, Long Point Wildlife Refuge HF radar, Martha's Vineyard HF radar, MVCO Meteorological Mast HF radar, Nantucket HF radar, and the Squibnocket Farms HF radar.

The VOR screening analysis for the Martha's Vineyard VOR/DME, Providence VOR/DME, and the Sandy Point VOR/DME shows that the study area is greater than 8 nm from these navigational aid sites. Although possible, Revolution Wind does not anticipate that the FAA would have concerns with wind turbines in the study area at a blade-tip height of 873 feet AGL based on impacts to these navigational aid sites.

The NEXRAD weather radar screening analysis for the Boston WSR-88D and the Brookhaven WSR-88D shows that wind turbines in the study area would not be within the line of sight of and would not interfere with these radar sites at a blade-tip height of 873 feet AGL. The results also show that wind turbines in the study area at a blade-tip height of 873 feet AGL would fall within a NOAA green No Impact Zone for these radar sites.

The TDWR screening analysis for the Boston TDWR shows that the study area is beyond the instrumented range of this radar site. As such, no additional analysis was considered necessary for this radar site. In summary, there would be a **minor** adverse impact to air defense and homeland security radar and a **negligible** adverse impact on weather radar.

To address these concerns, BOEM would include terms and conditions in the COP approval requiring 30- to 60-day advanced notification to the North American Aerospace Defense Command ahead of Project completion and when the Project is complete and operational for radar management (RAM) scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as described in the leasing agreement. Any other impacts on radar systems are anticipated to be mitigated by overlapping coverage and radar optimization. The FAA would evaluate potential impacts on radar systems, as well as mitigation measures, when Revolution Wind refiles Form 7460-1 for individual WTGs located within U.S. territorial waters. Revolution Wind's marine coordinator would remain on duty for the life of the Proposed Action to liaise with military, national security, civilian, and private interests to reduce potential radar conflicts. BOEM's (2020) study of radar interference concludes that HF SeaSonde radars, which monitor ocean currents, follow oil spills, and track powered and adrift vessels, are the most heavily impacted radar by offshore wind projects because WTGs create a phenomenon in which turbine echo is processed by these radar as current echo, resulting in interference with ocean current measurements. General mitigation measures determined by BOEM (2020) to be effective for HF radar include event-based operational changes and modification of some land-based radar. Event-based operational change

may include wind farm curtailment agreements for BOEM lease areas that would cease wind farm operations when HF radar efficiency is essential, such as in the event of a severe hurricane/tropical storm or a large oil spill. BOEM is also working on developing a land-based HF radar software upgrade (BOEM 2020).

The Proposed Action includes 1 × 1–nm WTG spacing that reduces, but does not eliminate, navigational complexity and space use conflicts during the operation phases of the Project. Navigational complexity in the area would remain constant during simultaneous operations and would decrease as the Project is decommissioned and structures are removed. The final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. Following the layout recommendations in the final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) would improve safety, but it would not completely remove the risk of allisions or collisions with WTGs during SAR operations (of people or marine mammals), particularly in challenging weather or visibility conditions. Therefore, the effects of the presence of offshore structures on land-based radar under the Proposed Action would be **negligible** adverse**.**

Vessel traffic: Operational vessel traffic from the Proposed Action is expected to increase, although it would be less than during the construction and decommissioning phases. This could impact land-based radar by increasing the number of vessels in the analysis area. The Proposed Action includes 1 × 1–nm WTG spacing that allows more space for vessels to navigate and would help reduce potential interference on radar systems. As a result, the effects of vessel traffic on land-based radar under the Proposed Action would be **negligible** adverse**.**

3.17.2.3.3 Cumulative Impacts

Offshore Activities and Facilities

Presence of structures: The Proposed Action would result in long-term negligible adverse impacts to land-based radar when compared to conditions under the No Action Alternative. These structures would increase the long-term risk of radar interference or clutter.

BOEM's radar study (2020) suggests general mitigation measures, including event-based operational changes and modification of some land-based radar through software upgrades to reduce impacts. For vessel-based radar, the Final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS, all enable safe navigation with minimal loss of radar detection. BOEM would include approval conditions in the COP regarding notification to North American Aerospace Defense Command of RAM scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as needed.

Therefore, the Proposed Action and past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to land-based radar.

Vessel traffic: The Project Action would result in an increase of offshore vessels during every phase of the Project. The increase in vessels in the analysis area would result in long-term impacts to land-based radar due to increased potential for radar interference or clutter. Reasonably foreseeable activities are

expected to also generate vessel traffic that would increase the number of vessels in the RI/MA WEA. Measures described under Presence of structures would reduce the cumulative impacts of increased vessel traffic to a **minor** adverse level when considering cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities.

3.17.2.3.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect land-based radar occurring in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates the impacts on land-based radar resulting from the Proposed Action alone would be **minor** adverse, as the overall effect would be managed through event-based operational changes and radar equipment upgrades.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall cumulative impacts associated with the Proposed Action combined with past, present, and reasonably foreseeable activities, would be **moderate** adverse for land-based radar.

3.17.2.4 Alternative B: Impacts of the Proposed Action on Military and National Security (including Search and Rescue)

3.17.2.4.1 Construction and Installation

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Anchoring and mooring activities would occur during offshore wind energy development within the analysis area as part of the Proposed Action. This would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. The presence of construction vessels could cause military vessels to change course or otherwise alter operations and could increase demand for SAR. These impacts are expected to be limited to cable emplacement corridors. Cable laying vessels are expected to travel slowly, typically at speeds of less than 1 knot, resulting in a low risk of collision with other vessels. In addition, it is anticipated that the USCG would establish temporary 500-yard navigation safety zones around each WTG foundation and each cable laying vessel, further reducing risk of contact with other vessels. Therefore, the effects of anchoring and new cable emplacement and maintenance under the Proposed Action on military and national security would be **negligible** adverse**.**

Aviation and aircraft traffic: Construction and installation of the Proposed Action would result in a 7% increase in general aviation in the GAA. Please refer to Section 3.17.2.2.1 for analysis of the Project's construction and installation impacts. The effects of this IPF on military and national security under the Proposed Action would be **minor** adverse, as there would be increased air traffic that could increase navigational complexities for military aircraft in the GAA.

Light: The Proposed Action would result in an increase in temporary construction aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize allision risks. Implementation of navigational lighting and marking per FAA and BOEM requirements and guidelines would further reduce

the risk of military aircraft collisions. This would result in a general increase of lights in the analysis area, which could have **minor** adverse impacts on military and national security by increasing the amount of light in the geographical analysis area.

Presence of structures: Access by military vessels to the RWF and RWEC would be limited during installation; however, USCG air- and waterborne SAR activities would still occur as needed. The addition of up to 100 WTGs, two OSSs, and two RWECs would increase the risk of allisions for military vessels for up to 35 years during Project operations, particularly in bad weather or low visibility. Military vessel traffic within the RI/MA WEA has historically been relatively low (four vessels recorded in 2016 and 2017), and deep-draft military vessels are not anticipated to navigate outside navigation channels unless necessary for SAR operations (BOEM 2021). Additionally, construction of the Proposed Action could attract recreational fishing or sightseeing vessels, which would add to the number of vessels operating in the area to complete construction of these Project elements. The presence of construction-related vessels and additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (USCG 2020) examined potential navigation SAR issues associated with anticipated offshore wind development in the RI/MA WEA. The USCG report concluded that a wind turbine array that follows a standard and uniform grid pattern with three lines of orientation and standard spaces, as proposed for the Project, would maintain the Coast Guard's ability to conduct SAR operations within the Lease Area (USCG 2020). BOEM (2020) acknowledges, however, that some SAR operations are aided by land-based radar vessel tracking, as well as wind and current tracking to extrapolate disabled vessel distance and direction, which can be inhibited by the presence of WTGs, and suggests mitigation related to radar equipment and event-based operational changes to counteract these effects. The navigational safety risk assessment found there are an average of 1.5 missions expected per year in the Lease Area (DNV GL Energy USA 2020). Therefore, it is anticipated that the presence of Project-related structures would impact some future USCG SAR missions. The presence of offshore wind infrastructure could require adjusting the operational parameters for such missions; however, the impact is anticipated to be minimal based on the uniform spacing of structures for waterborne SAR and other vessel maneuverability and mitigation for land-based radar.

Construction of the Proposed Action would necessitate use of stationary lift vessels within the RWEC, cranes in ports during construction, and FAA-regulated structures temporarily in transit routes between port and the WEA, increasing navigational complexity and changing navigational patterns for vessels and aircraft operating in the area around the WEA during construction and operations. Increased navigational complexity would increase the risk of collisions and allisions for military and national security vessels or aircraft within the WEA, and could increase demand for SAR. Structures would be marked as a navigational hazard per FAA, BOEM, and USCG requirements, and risk would be consistent within the 35-year operational period. It is anticipated that the USCG would establish temporary 500-yard (457-meter) navigation safety zones around each WTG foundation and each installation vessel, reducing risk of contact with other vessels The Project's 1 × 1–nm spacing reduces some of the risk of collisions and allisions. Based on the above impacts, the Project would have **minor** to **moderate** adverse impacts on military operations, including SAR, and national security due to the presence of structures.

Vessel traffic: There would be increased construction and operational vessel traffic from the Proposed Action. This could impact military and national security uses by increasing the number of vessels in the

analysis area. The RWF's proposed 1 × 1–nm spacing would result in sufficient space between foundations for vessels to navigate. UCSG establishment of temporary safety zones around cable laying vessels and foundation construction sites would further minimize the potential for construction vessel conflicts with military vessels. As a result, the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse**.**

3.17.2.4.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Anchoring and mooring activities would occur during offshore wind energy O&M and decommissioning within the analysis area as part of the Proposed Action. This would involve increased vessel traffic which could impact military and national security uses by increasing the number of vessels within the analysis area. However, the impacts are expected to be small and infrequent during O&M and decommissioning of offshore Project elements. Therefore, the effects of anchoring and new cable emplacement/maintenance under the Proposed Action on military and national security would be **negligible** adverse.

Aviation and aircraft traffic: O&M of the Proposed Action would result in a 0.01% increase in annual general aviation traffic in the GAA. Please refer to Section 3.17.2.2.2 for analysis of the Project's O&M impacts. The increase in vessel traffic associated with Project O&M could result in an increased demand for SAR, and increased military aircraft traffic in and around the RWF. Therefore, the effects of this IPF on military and national security activities under the Proposed Action, including SAR, would be **negligible** adverse.

Light: The O&M and decommissioning of the Proposed Action would result in an increase in permanent lighting on WTGs offshore until decommissioning is complete. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks. This would result in a general increase of lights in the analysis area, which could have a small impact on military and national security. The addition of permanent lighting would be an ongoing impact; therefore, the effects of light on military and national security under the Proposed Action would be **minor** adverse.

Presence of structures: The addition of up to 100 WTGs and up to two RWECs would increase risk of allisions for military vessels for up to 35 years during Project operations, particularly in bad weather or low visibility. Military traffic within the RI/MA WEA has historically been relatively low (four vessels recorded in 2016 and 2017), and deep-draft military vessels are not anticipated to navigate outside navigation channels unless necessary for SAR operations (BOEM 2021). Additionally, the Proposed Action could create an artificial reef effect until decommissioning is complete, attracting species of interest to recreational fishing or sightseeing, and attracting additional recreational fishing and sightseeing vessels that would be additive to existing vessel traffic in the area. The presence of additional recreational vessels would add to conflict or collision risks for military and national security vessels and could increase demand for SAR operations. Therefore, the Project would have **minor** adverse impacts on military operations and national security.

Vessel traffic: There would be increased operational vessel traffic from the Proposed Action. This could impact military and national security uses by increasing the number of vessels in the analysis area. The

RWF's proposed 1 × 1–nm spacing would result in more space for vessels to navigate and would help reduce conflicts with military vessels. As a result, the effects of vessel traffic on military and national security uses under the Proposed Action would be **minor** adverse**.**

3.17.2.4.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Up to 19,526 acres could be affected by anchoring and mooring activities and cable installation during offshore wind energy development within the analysis area as part of the Proposed Action and other reasonably foreseeable future actions. This offshore energy facility construction of new cable emplacement and maintenance of cables would involve increased vessel traffic, which could impact military and national security uses by increasing the number of vessels within the analysis area. Increased vessel traffic due to anchoring and cable maintenance of wind facilities could lead to course changes of military vessels, thereby increasing navigational complexity and risk of collisions. However, these impacts are expected to be limited to cable emplacement corridors which would result in contact with cable emplacement and maintenance vessels of expected from the Proposed Action and future offshore wind activities. Therefore, the cumulative effects of anchoring and new cable emplacement and maintenance would be a **minor** adverse impact on military and national security.

Aviation and aircraft traffic: The Proposed Action would result in a measurable increase in general aviation traffic in the GAA during construction and installation, as well as decommissioning, which is expected to be similar in aviation traffic volumes and construction and installation. The Proposed Action would result in a negligible effect on aviation traffic during O&M of the RWF. Other planned and potential future offshore wind projects could also result in increased air traffic due to the use of helicopters and other aircraft during construction and installation, O&M, and decommissioning. While the aviation requirements of other reasonably foreseeable offshore wind activities are unknown, it is anticipated that the aviation requirements for construction and O&M of these projects would be similar to those for the Proposed Action. Construction of these projects may occur concurrently between now and 2030 and, with a conservative 7% increase in aircraft traffic for all aircraft types in the GAA, the cumulative increase in air traffic during the construction period would be additive. Once projects are operational, cumulative O&M air traffic would likely result in a 0.1% increase in aviation traffic for all aircraft. The Proposed Action and reasonably foreseeable future wind projects would be required to engage the FAA in flight planning to avoid impacts to civilian, commercial, government, and military aviation operations. Therefore, the Proposed Action when combined with past, present, and other reasonably foreseeable project impacts would result in **minor** adverse impacts on military and national security.

Light: The Proposed Action would result in an increase in permanent aviation warning lighting on WTGs offshore. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks and optimize aviation safety. This would result in a general increase of lighting in the GAA, adding to vessel, navigation, onshore housing, and port lighting, which could impact military and national security uses. The Project, in combination with other reasonably foreseeable future actions, could result in the addition of up to 1,138 lighted structures in the analysis area. Therefore, because Project activities combined with reasonably foreseeable

activities would result in an increase in lighted structures offshore, the cumulative impacts of light on military and national security would be **minor** adverse.

Presence of structures and vessel traffic: The Proposed Action would require approximately 970 construction vessel trips per construction day over the 2-year construction period. This vessel activity would increase the risk of collisions, allisions, and spills. However, the Proposed Action represents approximately 2% of typical vessel traffic in the GAA. Therefore, the Proposed Action would result in **negligible** adverse impacts to military and national security uses.

BOEM estimates a peak of 380 vessels due to offshore wind project construction over a 10-year time frame. Although the number of construction vessels would represent a large portion of the traffic in the region, most vessels would remain in the Maximum Work Area, with fewer vessels transporting materials back and forth from ports. With multiple offshore wind projects under construction, traffic would also be spread among multiple ports to ensure that sufficient capacity exists at each port and in each waterway. Additionally, BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and decommissioning activity.

The Proposed Action would result in noticeable impacts to military and national security through the installation and operation of up to 100 WTGs and two OSSs, along with stationary lift vessels and cranes during construction, to conditions under the No Action Alternative, for a total of 1,138 structures within the GAA. The Proposed Action structures represents a 10% increase over total estimated WTG and OSS foundations across the GAA under the No Action Alternative.

Project structures are likely to generate artificial reef effects that lead to increased abundance of commercially and recreationally desirable fish and shellfish within wind farm boundaries. This could in turn lead to an increase in commercial and recreational vessel traffic and activity in and around wind farms. Increased vessel traffic and presence of structures would therefore contribute to an increase the short-term and long-term collision and allision risks for military and national security vessels, as well as search and rescue vessels. However, deep-draft military vessels are not anticipated to transit outside navigation channels unless needed for search and rescue. Potential allision risks if these vessels lost power would be minimized through the Proposed Action's 1 ×1–nm WTG spacing. BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and decommissioning.

Changing navigation patterns could also concentrate vessels within and around the outsides of the RI and MA Lease Areas, potentially causing space use conflicts in these areas or reducing the effectiveness of SAR operations. While the addition of Project structures and associated construction vessels would also increase navigational complexity or alter navigation patterns for military and national security aircraft operating in the region, Project structures would be marked as a navigational hazard per FAA, BOEM, and USCG guidelines and WTGs would be visible on military and national security vessel and aircraft radar. The Proposed Action would implement a 1 × 1–nm spacing, consistent with all other projects in the RI/MA WEA.

Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action Alternative, which would be **moderate** adverse for presence of structures and **minor** adverse for vessel traffic on military and national security.

3.17.2.4.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect ongoing military uses in the analysis area. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates that the impacts resulting from the Proposed Action alone that range from interference with ongoing military and national security activities to an expected increase in demand for SAR would range from negligible to moderate adverse. Therefore, BOEM expects the overall impact on military and national security from the Proposed Action alone to be **minor** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** adverse to **moderate** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **moderate** adverse for military uses.

3.17.2.5 Alternative B: Impacts of the Proposed Action on Scientific Research and Surveys (see section in main EIS)

3.17.2.6 Alternative B: Impacts of the Proposed Action on Undersea Cables

3.17.2.6.1 Construction and Installation

Offshore Activities and Facilities

Presence of structures: Up to 100 WTGs, two OSS foundations, and two RWECs would be installed as part of the Proposed Action. The RWEC would cross up to seven identified subsea assets within the installation corridor, including three telecommunications cables.

The presence of the Project could preclude future submarine cable placement in the RWF and RWEC, although there are no future cables identified for location within this area. The presence of the RWF would likely require routing of future undersea cables around the Lease Area. Cable crossings of the RWEC would necessarily include mapping and installation of cable protection at the crossing location, standard design techniques for undersea cable installation. The impacts from foundation construction would be **minor** adverse while the installation of the RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables would be **minor** adverse.

Vessel traffic: Increased vessel traffic due to construction and installation of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Increased construction vessel traffic due to Project construction could lead to course changes of vessels used for undersea cable maintenance and installation and increased traffic along vessel transit routes. Additionally, there would be increased risk for allisions with vessels used for construction of undersea cables. These effects during the construction and installation phase are expected to be minimal and short term. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse.

3.17.2.6.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Presence of structures: Up to 100 WTGs, two OSS foundations and two RWECs would be installed as part of the Proposed Action. The presence of the Project could preclude future submarine cable placement. O&M of the Project would be less likely to interfere with future undersea cable development than construction and decommissioning. OSS and WTG foundations would have a larger footprint compared to the RWECs, which are buried, and therefore would be more likely to preclude future undersea cable development. Once the foundations are constructed, impacts from foundation O&M and decommissioning would be **minor** adverse and O&M and decommissioning of RWECs would be **negligible** adverse. The overall impact from presence of structures on undersea cables is **minor** adverse.

Vessel traffic: Increased vessel traffic due to O&M and decommissioning of the Proposed Action could interfere with vessels used to install or maintain existing and future undersea cables. Additionally, there is increased risk for allisions with vessels used for undersea cable O&M. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. These effects during the construction and installation phase are expected to be minimal and short in duration. Therefore, the effects of vessel traffic on undersea cables under the Proposed Action would be **negligible** adverse.

3.17.2.6.3 Cumulative Impacts

Offshore Activities and Facilities

Presence of structures: The Proposed Action would result in long-term impacts to existing undersea cables through the installation of up to 100 WTGs and two OSSs to conditions under the No Action Alternative. BOEM estimates a cumulative total of up to 1,138 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA.

Construction of the foundations associated with the Proposed Action and reasonably foreseeable future actions could increase the complexity of undersea cable development by requiring routing around the facilities. Export cables are unlikely to preclude future undersea cable development because cable crossings can be protected using standard design techniques. Therefore, in context of reasonably foreseeable environmental trends, the overall impacts from the presence of structures resulting from the Proposed Action and planned actions are anticipated to be localized long term **negligible** because impacts can be avoided by routing design and standard cable protection techniques.

Vessel traffic: Vessel traffic related to construction and O&M of undersea cables is expected to increase if new undersea cables are constructed and as ongoing maintenance is required. Additionally, there would be increased vessel traffic due to the Proposed Action and reasonably foreseeable future actions. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Therefore, the cumulative impact from vessel traffic on undersea cables is **negligible** adverse.

3.17.2.6.4 Conclusions

Project construction and installation, O&M, and decommissioning would affect undersea cables occurring in the GAA. Similar impacts from Project O&M would occur, although at a lesser extent and duration for some uses. BOEM anticipates the impacts resulting from the Proposed Action alone would be **negligible**. Therefore, BOEM expects the overall impact on other uses from the Proposed Action alone to be **negligible** adverse for undersea cables.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would be **negligible**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be **negligible** adverse impacts for undersea cables.

3.17.2.7 Alternatives C, D, E, and F: Aviation and Air Traffic

Table 3.17-1 provides a summary of IPF findings by alternative.

3.17.2.7.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be **negligible** adverse to the Proposed Action. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **minor** adverse impacts for aviation and air traffic.

3.17.2.8 Alternatives C D, E, and F: Land-Based Radar

Table 3.17-1 provides a summary of IPF findings by alternative.

3.17.2.8.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **minor** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse impacts for land-based radar.

3.17.2.9 Alternatives C, D, E, and F: Military and National Security (including Search and Rescue)

Table 3.17-1 provides a summary of IPF findings by alternative.

3.17.2.9.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action: **minor** adverse. The overall impacts of Alternatives C through F when combined with

past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **moderate** adverse for military uses and national security.

3.17.2.10 Alternatives C, D, E, and F: Scientific Research and Surveys (see section in main EIS)

3.17.2.11 Alternatives C, D, E, and F: Undersea Cables

Table 3.17-1 provides a summary of IPF findings by alternative.

3.17.2.11.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from each alternative alone would be the same as the Proposed Action: **negligible** adverse. The overall impacts of Alternatives C through F when combined with past, present, and reasonably foreseeable activities would therefore be the same as under the Proposed Action: **negligible** adverse for undersea cables.

3.17.2.12 Mitigation

Mitigation measures for other uses (land-based radar and military and national security) proposed by BOEM and other cooperating agencies are listed in Appendix F, Table F-2 and here in more detail in Table 3.17-2. Not every other uses category has proposed mitigation measures; aviation and air traffic and undersea cables do not.

Table 3.17-2. Proposed Mitigation Measures – Other Uses (land-based radar and military and national security)

Mitigation Measure	Description	Effect
Land-based Radar		
Operational mitigation for ARSR-4 and ASR-8/9 radar	Mitigation for ASR-8/9 radar: • Passive aircraft tracking using ADS-B or signal/transponder • Increasing aircraft altitude near radar • Sensitivity time control (range-dependent attenuation) • Range azimuth gating (ability to isolate/ignore signals from specific range-angle gates) • Track initiation inhibit, velocity editing, plot amplitude thresholding (limiting the amplitude of certain signals) Modification mitigations for ARSR-4 and ASR-8/9 systems include using the dual beams of the radar simultaneously and using in-fill radar. Additional conditions for COP approval to mitigate potential impacts on ASR-8/9 include notifying the North American Aerospace Defense Command 30 to 60 days ahead of Project completion and when the Project is complete and operational for Radar Adverse-impact Management	These measures would reduce the anticipated minor adverse impacts to air defense and homeland security radar systems.

Mitigation Measure	Description	Effect
	(RAM) scheduling, contributing funds toward execution of the RAM, and curtailment of operations for national security or defense purposes.	
Mitigation for oceanographic HF radar	WTG operators sharing real-time surface current telemetry, other oceanographic data, and wind turbine operational data with radar operators would serve to aid interference mitigation. Mitigation would also include a wind farm curtailment agreement. Additional modifications identified for oceanographic HF radar systems include signal processing enhancements and antenna modifications.	These measures would complement existing EPMs and further reduce anticipated negligible impacts to weather radar and minor adverse impacts on SAR activities.
Mitigation for NEXRAD weather radar systems	Research is underway for potential to mitigate weather radar using phased array radars to achieve a null in the antenna radiation pattern in the direction of the wind turbine. Additional mitigation includes a wind farm curtailment agreement.	This measure would further reduce anticipated negligible impacts on weather radar systems.
Military and National Security		
Fiber-optic sensing technology	Distributed fiber-optic sensing (DFOS) technology proposed for the wind energy project or associated transmission cables would be reviewed by the DOD to ensure that DFOS is not used to detect sensitive data from DOD activities, to conduct any other type of surveillance of U.S. government operations, or to otherwise pose a threat to national security.	This measure would reduce potential adverse impacts to military and national security.
WTG shut-down mechanism	Equip all WTG rotors (blade assemblies) with control mechanisms to enable remote shutdown of requested WTGs by the USCG. A formal shut-down procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shutdowns would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG.	This measure would reduce potential adverse impacts to military and national security.
Operational mitigation for ARSR-4 and ASR-8/9 radar	Mitigation for ASR-8/9 radar: • Passive aircraft tracking using ADS-B or signal/transponder • Increasing aircraft altitude near radar • Sensitivity time control (range-dependent attenuation) • Range azimuth gating (ability to isolate/ignore signals from specific range-angle gates) • Track initiation inhibit, velocity editing, plot amplitude thresholding (limiting the amplitude of certain signals) Modification mitigations for ARSR-4 and ASR-8/9 systems include using the dual beams of the radar simultaneously and using in-fill radar. Additional conditions for COP approval to mitigate potential impacts on ASR-8/9 include notifying North American Aerospace Defense Command 30 to 60 days ahead	These measures would reduce the anticipated minor adverse impacts to air defense and homeland security radar systems.

Mitigation Measure	Description	Effect
	of Project completion and when the Project is complete and operational for RAM scheduling, contributing funds toward execution of the RAM, and curtailment of operations for national security or defense purposes.	
Mitigation for oceanographic HF radar	Through data sharing from turbine operators of real-time surface current telemetry, other oceanographic data, and wind turbine operational data with radar operators into the public domain to aid interference mitigation. Mitigation would also include a wind farm curtailment agreement. Additional modifications identified for oceanographic high-frequency radar systems include signal processing enhancements and antenna modifications.	These measures would complement existing EPMs and further reduce anticipated negligible impacts to weather radar and minor adverse impacts on SAR activities.
Mitigation for NEXRAD weather radar systems	Research is underway for potential to mitigate weather radar using phased array radars to achieve a null in the antenna radiation pattern in the direction of the wind turbine. Additional mitigation includes a wind farm curtailment agreement.	This measure would further reduce anticipated negligible impacts on weather radar systems.

3.18 Recreation and Tourism

3.18.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Recreation and Tourism

Geographic analysis area: The GAA for recreation and tourism (Figure 3.18-1) comprises all Project components plus a 40-mile radius around the Lease Area. The area covers approximately 6,113 square miles of open ocean, 1,488 square miles of land, and over 1,008 miles of shoreline, and coincides with the Project's visual impact assessment (EDR 2021) to 1) address Project visibility from visually sensitive resources located within New York, Connecticut, Rhode Island, and Massachusetts and 2) encompass all locations where BOEM anticipates recreation impacts associated with Project construction and installation, O&M, and decommissioning.

Affected environment: Recreation and tourism play a major role in the leisure pursuits of local residents and the coastal economies of the states affected by the Project (see Section 3.9 and Section 3.11). NOAA collects economic data for six sectors dependent on the ocean and Great Lakes: living resources, marine construction, marine transportation, offshore mineral resources, ship and boat building, and tourism and recreation. Tourism and recreation statistics from NOAA's Economics: National Ocean Watch are good indicators of coastal and ocean tourism because they estimate the ocean-dependent portion of business for hotels and restaurants by including only those establishments located in shore-adjacent zip code areas, and they exclude all forms of sports and entertainment that are not ocean-related. A summary of economic data for counties and states that fall within the recreation and tourism analysis area is aggregated in Table 3.18-1. As of 2018, ocean economy sectors accounted for 3% to 22% of the total economy for affected counties and states. Tourism and recreation were the substantive sources of economic activity for most locations.

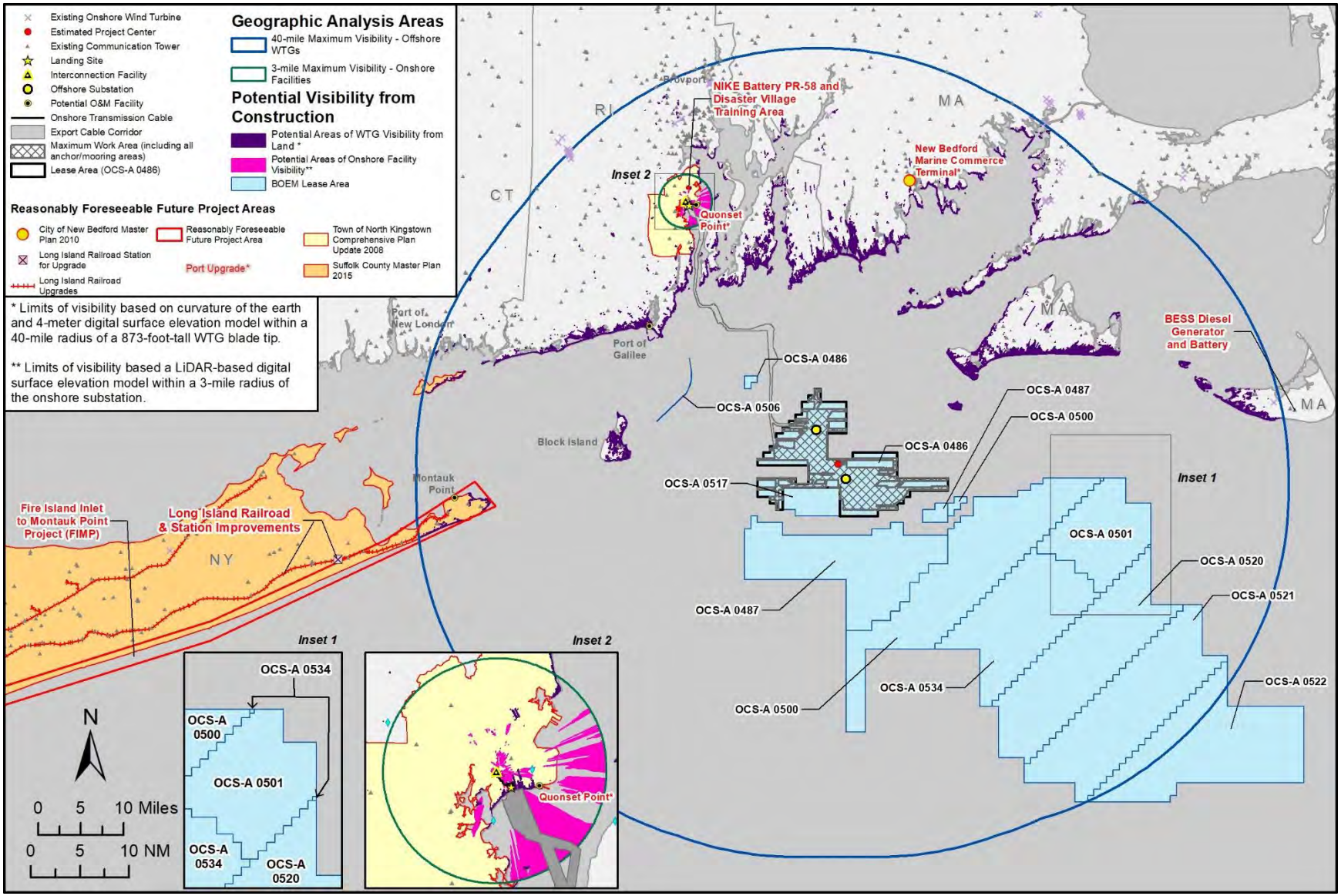

Figure 3.18-1. Geographic analysis area for recreation and tourism.

Table 3.18-1. Ocean Economies for Counties and States that Would be Directly or Indirectly Affected by the Project

Location	% of Total Economy	Number of Employed Residents for Tourism and Recreation (% of total residents employed in ocean economy)	Total Wages for Tourism and Recreation (% of total wages generated by ocean economy)	Total Gross Domestic Product for Tourism and Recreation (% of total gross domestic product generated by ocean economy)
Suffolk County, NY	6%	36,385 (87.9%)	921.1 million (70.1%)	1.9 billion (73.4%)
New London, CT	17%	7,397 (36.2%)	176.5 million (12.9%)	374.3 million (15.5%)
Washington, RI	21%	6,032 (53.5%)	145.2 million (31.6%)	327.6 million (27.6%)
Kent, RI	10%	7,338 (96.4%)	148.5 million (91.7%)	321.8 million (93.0%)
Providence, RI	6%	14,803 (92.1%)	326.3 million (84.8%)	700.0 million (87.9%)
Bristol, RI	17%	1,977 (86.8%)	46.5 million (76.8%)	96.1 million (72.6%)
Bristol, MA	3%	2,963 (48.9%)	55.0 million (19.1%)	105.8 million (16%)
Newport, RI	21%	6,976 (82.0%)	184.4 million (54.2%)	444.1 million (56.8%)
Plymouth, MA	5%	9,180 (87.5%)	203.8 million (71.2%)	400.9 million (71.3%)
Barnstable, MA	19%	17,028 (94.0%)	489.3 million (87.9%)	1.1 billion (87.0%)
Dukes, MA	16%	1,394 (97.5%)	52.9 million (96.1%)	120.1 million (96.9%)
Nantucket, MA	22%	1,668 (99.5%)	71.2 million (99.7%)	159.7 million (99.8%)

Source: NOAA (2020)

Notes: CT = Connecticut, MA = Massachusetts, NY = New York, RI = Rhode Island.

The analysis area for recreation and tourism supports a wide range of inland, shoreline or beach, and ocean-based recreation and tourist activities, including 16 water trails, more than 1,000 conservation areas, nearly 1,000 hiking trails, New Bedford Whaling National Historical Park, several hundred designated SCUBA diving areas, and 78 marinas (Northeast Ocean Data 2021). Recreational activities include beach-going, boating (for pleasure and competition), walking-hiking, swimming, surfing, metal detecting, horseback riding, camping, stand-up paddleboarding, cross-country skiing, kite sailing, and scenic-bird-nature viewing. The *Ocean State Outdoors Rhode Island's Comprehensive Outdoor Recreation Plan* (Rhode Island DEM 2019) identifies visiting coastal areas-beaches as one of the top three outdoor activities by Rhode Island residents. Likewise, Connecticut's statewide survey identifies beach activities as the top water-related recreation activity by residents (Center for Public Policy & Social Research 2017). Road or trail biking, birdwatching, and camping are also activities reported as displaying a relatively high degree of participation. Based on a broader study encompassing the northeast United States, the five most popular activities in the northeast region are beachgoing (61.9%), scenic enjoyment-sightseeing (50.2%), watching marine life (33.7%), photography (32.5%), and collecting non-living resources-beachcombing (27.4%) (Bloeser et al. 2015). The same study notes that surfing, stand-up paddleboarding, and triathlon typically occurred in nearshore bay-protected waters.

Locally, Blue Beach, a public beach, is approximately 500 feet west of the southwest corner of the Project's proposed 20-acre landfall envelope. Blue Beach is accessed via a trail located west of the Hayward Industries, Inc. building, which is just outside the landfall envelope. Compass Rose Beach, another public beach, is approximately 2,600 feet east of the southeast corner of the landfall envelope. The Martha's Vineyard Fast Ferry dock is directly east of Compass Rose Beach. The North Kingstown Golf Course is approximately 2,000 feet north of the northern edge of the landfall envelope and is separated by Roger Williams Way.

Boating in the analysis area includes ocean-going vessels down to small boats used by residents and tourists in sheltered waters. A 2012 survey of recreational boaters along the northeastern U.S. coast found that more than half (52.4%) of recreational boating occurred within 1 nm of the coastline (Starbuck and Lipsky 2013). In 2011, NOAA estimated that 93% of the 2011 recreational boating from Massachusetts occurred within 3 nm of shore (BOEM 2012). However, several long-distance sailboat races may pass through the offshore portions of analysis area, depending on the route selected for a particular year; these races include the Transatlantic Race, Marion to Bermuda Race, and Newport to Bermuda Race. Although these sailing events occur along the entire Long Island coastline, they are generally small (averaging less than 50 racing vessels). Larger sightseeing boats also travel to offshore locations where sightings of whales are more likely.

Recreational fishing along the shoreline and the pursuit of highly migratory species (HMS) such as tuna, shark, swordfish, and billfish are also popular recreational activities in the analysis area. In the nearby Vineyard Wind Lease Area, the recreational fishing effort for HMS occurs seasonally from June to October using a wide range of fishing methods, although mobile fishing methods predominate (Kneebone and Capizzano 2020). Coxes Ledge, The Fingers, and The Claw all support the highest level of recreational fishing for HMS (see Section 3.9 for additional discussion of recreational fishing activities and trends).

Although many of the above-listed publicly available recreation and tourism activities are free, local businesses also offer boat rentals and numerous recreation experiences such as private boat-cruise

charters; canoe, kayak, and stand-up-paddleboard touring; whale watching; deep-sea fishing charters; and scuba diving in the analysis area. These tourism activities also support other local businesses, including non-ocean-related leisure, hotels, and restaurants.

Recreation and tourism in the GAA are noticeably higher in the spring, summer, and fall when the ambient air and water temperatures are comfortable (Parsons and Firestone 2018).

3.18.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential recreation and tourism impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Construction of future projects would increase the number of anchored vessels and work platforms used for survey and construction purposes. Applying estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), up to 2,160 acres of anchoring could occur under the No Action Alternative in the recreation and tourism GAA. The presence of anchored vessels could increase navigation complexity for recreational vessels. Increased turbidity from anchoring could also briefly alter the behavior of species important to recreational fishing (see Section 3.9) and sightseeing (primarily whales, but also dolphins and seals). However, most anchored construction-related vessels would be located within temporary safety zones (anticipated to be established and monitored by offshore wind developers). Likewise, most anchoring would occur outside the area most commonly used for recreational boating, which would prevent most conflicts for recreational uses. Anchoring activities would also be temporary and localized; therefore, construction-related anchoring impacts from future projects would be **minor** adverse. Anchoring impacts to fish species used for recreational fishing are addressed in Section 3.9.

Up to 10,148 acres of seafloor disturbance could occur from IAC and export cable installation within the recreation and tourism GAA (see Appendix E4, Table E4-1). As with anchoring, installation of offshore cables would temporarily increase navigation complexity for recreational vessels present around work areas and reduce recreational opportunities if individuals prefer to avoid the noise and disruption caused by installation. Cable installation could also have temporary impacts on individual fish and invertebrates of interest for recreational fishing due to dredging, turbulence, and disturbance; however, no population-level species impacts would occur. Once installed, buried cables typically have no maintenance unless a fault or failure occurs. Smaller vessel anchors would not penetrate to the typical target cable burial depth (4 to 6 feet), and recreational vessel anchoring is uncommon in water depths where offshore structures would be installed. However, scour protection for cables and foundations could hinder boat anchoring and result in gear entanglement or loss if recreational activity coincides with scour protection areas. If project-related seafloor hazards are not noted on charts, operators could lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. Therefore, new cable emplacement and maintenance would result in temporary to long-term **minor** adverse impacts.

Light: Construction of future planned offshore projects would require nighttime lighting on WTGs, vessels, and platforms that could be visible by onshore recreational users and tourists, as well as offshore

boaters recreating at night or in low-light conditions. O&M of the estimated 936 WTGs in the GAA would require permanent aviation warning lights that could be visible from some beaches and coastlines and could impact recreation and tourism if recreation decisions are influenced by lighting. Field observations made from the mainland shoreline during WTG operations at the Block Island Wind Farm indicated that at nighttime and under clear skies, the turbine lights were visible with the naked eye up to 26.75 miles (23.2 nm) (HDR 2019). A University of Delaware study evaluating the impacts of visible offshore WTGs on beach use found that WTGs visible more than 15 miles from the viewer would have negligible adverse impacts on businesses dependent on recreation and tourism (Parsons and Firestone 2018). Likewise, a 2017 study on the impact of offshore wind facilities on vacation rental prices found that nighttime views of aviation hazard lighting (without ADLS) for WTGs close to shore (5 to 8 miles) would adversely impact the rental price of properties with ocean views (Lutzeyer et al. 2017). However, the study did not specifically address the relationship between lighting, nighttime views, and tourism for WTGs located farther from shore.

A 2013 BOEM study evaluated the impacts of WTG lighting on birds, bats, marine mammals, sea turtles, and fish. The study found that existing guidelines "appear to provide for the marking and lighting of [WTGs] that would pose minimal if any impacts on birds, bats, marine mammals, sea turtles or fish" (Orr et al. 2013). By extension, existing lighting guidelines or ADLS (if implemented) would not impact recreational fishing or wildlife viewing opportunities.

Lighting impacts would be most pronounced for views that can be currently characterized as undeveloped, where lighting from human infrastructure and activities is not dominant or even exists. However, less than 5% of the lighted WTG positions envisioned in the GAA would be within 15 miles from coastal locations. Therefore, visual impacts on recreation and tourism would be short term during construction and long term during O&M, with **negligible** to **moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed.

Noise: Construction noise from offshore activities from planned future projects such as pile driving, trenching, and construction-related vessels would intrude upon the natural sounds of the marine environment. Pile driving is the loudest aspect of most planned future projects. Most pile driving would occur far enough offshore that that work would be inaudible from onshore locations or from typical recreational fishing locations (within 1 mile of the coast). However, pile driving and other construction noise could cause some offshore boaters and recreational fishers to avoid areas of noise-generating activity, although the loudest noise would be within the temporary safety zones (with restricted recreational and tourism vessel access) anticipated to be established for each project by offshore wind developers. Additionally, because some fish species are sensitive to underwater sound, construction noise could cause fish to move away from the noise source, which could adversely affect recreational fishing opportunities near work areas. Construction noise could also contribute to impacts on marine mammals, with resulting impacts on marine sightseeing that relies on the presence of mammals, primarily whales. However, as noted in Section 3.15, no population-level marine mammal effects are anticipated.

Most of the anticipated offshore O&M noise from future projects would be from continuous WTG operations farther offshore. Sound pressure levels would be at or below ambient levels at relatively short distances from WTG foundations (Kraus et al. 2016). Field observations made during normal operations at the Block Island Wind Farm minimally exceeded ambient levels at 164 feet from the WTG base. These field observations also concluded that WTG operational noise from the Block Island Wind Farm was not

detectable from shore and further suggested that as wind speeds increase (causing increased ambient noise), the associated increase in operational noise of the WTG becomes less detectable (HDR 2019). Therefore, noise from offshore activities would result in temporary to long-term **minor** adverse impacts.

Presence of structures: The placement and operation of up to 953 foundations (see Table E4-1 in Appendix E4) are proposed within the recreation and tourism GAA. Recreational impacts associated with in-water structures would include the risk of recreational vessel allision and collision, fishing gear entanglement, vessel damage or loss, increased navigation hazards, and visual impacts.

Offshore routes for recreational boaters, anglers, sailboat races, and sightseeing boats could require adjustment to avoid allision risks with in-water structures. Generally, the vessels more likely to allide with WTGs or OSSs would be smaller vessels capable of moving within and near wind installations. Examples include recreational fishing (especially HMS fishing), long-distance sailboat races, sightseeing boats, and large sailing vessels. Sailing vessels with tall masts that could be affected by in-water structures, like WTGs and associated platforms, could choose to avoid offshore in-water structures. However, the adverse impact of the future offshore wind structures on recreational boating would be limited by the distance offshore. As previously noted, a 2012 survey of recreational boaters along the northeastern United States coast found that the highest density of recreational vessels occurs within 1 nm of the coastline (Starbuck and Lipsky 2013). Likewise, a 2020 study of recreational boaters in the RI/MA WEA found that wind facilities are unlikely to have significant impacts on recreational boaters because those boaters prefer to use waters closer to the coast. Most recreational boaters from Rhode Island ports who choose to visit the RI/MA WEAs would likely keep their distance from new structures, and increased abundance of targeted fish species near offshore wind facilities would have beneficial impacts on recreational fishing (Dalton et al. 2020). Based on these findings, under the No Action Alternative, most recreational vessels would not interact with proposed WTGs and OSS(s). However, WTGs could also attract recreational boaters and sightseeing vessels. These conditions could increase the number of congregating vessels and increase collision or allision risks (see Section 3.16 for additional discussion of navigation impacts). The USCG would need to adjust their search and rescue planning and search patterns to allow aircraft to fly within the GAA, as described in greater detail in Section 3.17.

HMS fisheries are further offshore than most fisheries and therefore more likely to overlap with future offshore wind development. The greatest amount of recreational HMS fishing effort in southern New England from 2002 through 2018 occurred west of the RI/MA WEA (Kneebone and Capizzano 2020), although HMS fishing also occurred in specific locations within the RI/MA WEA, including The Dump, Coxes Ledge, The Fingers, and The Claw (see Section 3.9). Commonly used mobile methods for HMS angling such as trolling and drifting could be incompatible with the presence of WTGs and OSSs, depending upon weather conditions and specific techniques. For example, trolling could involve trailing many feet of lines and hooks behind the vessel and then following large pelagic fish once they are hooked, posing navigational and maneuverability challenges around WTGs. Scour protection used for in-water foundations would also increase risk of recreational fishing gear loss or damage by entanglement and present a hazard for anchoring (see new cable placement above). These concerns notwithstanding, new in-water structures could result in several long-term beneficial impacts including increased recreational fishing by introducing new aquatic habitats (see Section 3.9) and increased tourism by people interested in viewing the structures (see Section 3.18.2.2.2). New in-water structures could also create foraging opportunities for seals, small odontocetes, and sea turtles (see Sections 3.15 and 3.19), which could offer recreational sightseeing opportunities.

Visual impacts from the presence of vertical structures on the offshore horizon would create a visual contrast contrary to the horizontal plane of the ocean's water surface and the line at the visual horizon that separates the ocean from sky. Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island's WTGs provide excellent sites for fishing and shellfishing (Smythe et al. 2018). The proximity of WTGs to shore may be correlated to recreational experience. As noted in Parsons and Firestone (2018), different changes to beach experience occurred based on distance to visible WTGs. Reported trip loss (respondents who stated that they would visit a different beach without offshore wind) averaged 8% when wind projects were 12.5 miles (20 km) offshore, 6% when 15 miles (24.1 km) offshore, and 5% when 20 miles (32 km) offshore. Conversely, approximately 2.6% of respondents were more likely to visit a beach with visible offshore wind facilities at any distance. A 2019 survey of coastal recreation users in New Hampshire (Ferguson et al. 2020) also found that most users (77%) supported offshore wind development along the New Hampshire coast, 74% anticipated that offshore wind development would have a neutral to beneficial impact on their recreational activities, and 26% anticipated that offshore wind development would have an adverse impact (Ferguson et al. 2020).

Based on the currently available studies, portions of nearly all 936 WTGs associated with the No Action Alternative could be visible from shorelines (depending on vegetation, topography, weather, atmospheric conditions, and the viewers' visual acuity), of which up to 38 WTGs (fewer than 5%) would be within 15 miles of shore (see Section 3.20 for details). WTGs visible from some shoreline locations in the GAA would have adverse impacts on visual resources when discernable because of the introduction of industrial elements in previously undeveloped views. Visual impacts would be more pronounced in views lacking development and outside of heavy recreation use times (i.e., when crowds of beachgoers do not impact the visitor's experience of the natural elements of the landscape). Based on the research cited above, the impact of visible structures on recreation would be long term and **moderate** adverse but unlikely to impact shore-based or marine recreation and tourism in the GAA as a whole. Visual impacts to tribes that may be present or travel to the GAA for recreation or tourism purposes are disclosed in Section 3.10.

Vessel traffic: Future projects would generate increased nearshore and offshore vessel traffic, primarily during construction, along routes between ports and the offshore wind construction areas. Applying vessel activity estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), vessel activity could peak in 2025 with as many as 276 vessels involved in the construction of reasonably foreseeable projects (see Section 3.16.1.1). Increased vessel traffic would require increased alertness on the part of recreational or tourist-related vessels and could result in minor delays or route adjustments, particularly if more than one future offshore wind facility is under construction at the same time. The likelihood of vessel collisions would increase as a result of the higher volumes of vessel traffic during construction. However, most of the moving construction-related vessels would be located within temporary safety zones (anticipated to be established and monitored by offshore wind developers), which would prevent most conflicts for recreational uses. These activities would also be temporary and localized. Although long-term increased traffic volumes from O&M of future projects would be low, they would add to existing in-water vessel traffic and therefore present **minor** long-term adverse impacts on recreational users.

Onshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: No anchoring impacts would occur as a result of future onshore activities. However, onshore construction and installation of future wind facilities could affect recreation and tourism due to noise and activity at the landfall locations or along the onshore cable route if these locations intersect recreational or commercial uses. These **minor** adverse impacts would be unavoidable during construction but would be temporary and localized. No long-term cable impacts are anticipated because cables would be buried.

Light: Construction of some planned future onshore projects would require new visible structures or nighttime lighting on structures that could be visible by onshore recreational users and tourists. However, most onshore project components are anticipated to be in previously developed and lighted areas. Therefore, adverse effects of onshore lighting from construction would be short term and localized to discrete construction sites. Onshore O&M impacts from future projects would be variable based on project type (i.e., increased rail and road infrastructure use, increased port operational noise) but are anticipated to be long term with variable **minor** to **moderate** adverse impacts experienced based on the observed distance.

Noise: Construction noise from planned future projects onshore would be variable based on project type, but many projects would include one or more noise-generating activities such as earth moving, pile driving, trenching, jackhammering, and other similar large equipment operations. Recreational users could be subject to these construction noises anywhere future projects intersect public access areas, public recreational facilities, public roadways, or private and commercial facilities where tourism occurs (e.g., restaurants, shopping, and lodging establishments). Onshore construction noise from cable installation at the landfall locations, and inland if cable routes are near parkland, recreation areas, or other areas of public interest, would temporarily disturb the quiet enjoyment of the site (in locations where such quiet is an expected or typical condition). However, most of these onshore project components are anticipated to be in previously developed areas. Therefore, adverse effects of onshore noise from construction would be short term and localized to discrete construction sites. Onshore O&M impacts from future projects would be variable based on project type (i.e., increased rail and road infrastructure use, increased port operational noise) but are anticipated to be adverse and long term with variable **minor** to **moderate** adverse impacts experienced based on the distance to the noise source.

Vessel traffic: Future projects could increase onshore vehicle traffic or alter traffic patterns in a manner that inconveniences recreational users, primarily during construction near port facilities and on adjacent, existing roadways. Construction vehicles and construction areas would follow established safety guidelines that would prevent most conflicts for recreational uses. Impacts from onshore activities would be temporary and localized; therefore, construction impacts from future projects would not add to adverse impacts on recreational users. Although long-term increased traffic volumes from O&M activities of future projects would be relatively low, they would add to the existing onshore traffic and therefore present **minor**, localized long-term adverse impacts on recreational users.

3.18.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on recreation and tourism associated with the Project would not occur. However, ongoing and future activities would have

continuing short-term to long-term impacts on recreation and tourism, primarily due to the interruption of access and introduction of new offshore hazards, as well as new aquatic habitat and increased tourism/recreation opportunities.

BOEM anticipates that the range of individual IPF impacts for reasonably foreseeable offshore wind activities would be **negligible** to **moderate** adverse and **minor** beneficial, primarily due to the presence of offshore structures. As described in Appendix E1, BOEM anticipates that the range of individual IPF impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate** adverse.

Considering all the IPFs together, BOEM anticipates that the overall impact associated with all reasonably foreseeable environmental trends and activities would result in **minor** adverse impacts on recreation and tourism because most adverse impacts could be avoided, would not disrupt normal or routine recreation and tourism functions, or would return to a condition with no measurable effects after activity ends.

3.18.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that would influence the magnitude of the impacts on recreation and tourism consists of the number and type of WTGs installed. Impacts on recreational fishing and boating are based on the installation of 100 WTGs and two OSSs, for a total of 102 foundations in the GAA. If Revolution Wind were instead to install 59 12-MW WTGs, the maximum height of the blade tip for WTGs would be 873 feet above the surface, compared to 648 feet for the 8-MW WTGs. Because the WTGs would exceed 699 feet, FAA regulations require supplemental mid-tower lighting, in addition to lighting at the top of the nacelle (FAA 2018). The taller WTGs and additional lighting would result in greater visual impacts within the GAA. However, the 12-MW WTG option would reduce the number of WTGs and IAC; therefore, navigational complexity for offshore recreation users would be reduced compared to the 8-MW WTG option.

Revolution Wind has committed to implementing ADLS (as described in Appendix F) as a measure to reduce the duration of lighting impacts. Revolution Wind would also establish temporary safety zones around construction areas and work with the USCG to communicate these zones and other work areas to the boating public via local Notices to Mariners. These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for recreation and tourism across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E1 Table E2-10.

Table 3.18-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The Conclusion section within each alternative analysis discussion includes rationale for the effects determinations. All of the action alternatives would include both adverse and beneficial effects. Overall, these effects to recreation and tourism across all alternatives would be **minor** adverse because they would be small, and the resource would be expected to recover completely with no mitigating action required.

Table 3.18-2. Alternative Comparison Summary for Recreation and Tourism

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Anchoring and new cable emplacement/ maintenance	**Offshore**: Most anchoring would occur outside the area most commonly used for recreational boating, which would prevent most conflicts for recreational uses. Anchoring activities would also be temporary and localized; therefore, construction-related anchoring impacts from future projects would be **minor** adverse. Smaller vessel anchors would not penetrate to the typical target cable burial depth (4 to 6 feet), and recreational vessel anchoring is uncommon in water depths where offshore structures would be installed. However, scour protection for cables and foundations could hinder boat anchoring and result in gear entanglement or loss if recreational activity coincides with scour protection areas. If project-related seafloor hazards are not noted on charts, operators could lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. Therefore, new cable emplacement and maintenance would result in temporary to long-term **minor** adverse impacts.	**Offshore**: Installation of offshore cables and anchoring would temporarily restrict recreation access within the cable routes. Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements. Temporary safety zones around each WTG site and each cable-laying vessel (anticipated to be established and monitored by Revolution Wind) would minimize potential conflicts for recreational uses. Potential O&M anchoring impacts would be similar to the construction phase, but reduced due to fewer anchored vessels. Therefore, potential changes in navigation routes due to Proposed Action would constitute a temporary, **minor** adverse impact. Cable installation could also affect fish and mammals of interest for recreational fishing and sightseeing through dredging and turbulence, although no population-level impacts are expected, resulting in short-term **minor** adverse impacts. Up to approximately 5,338 acres of anchoring and 14,157 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including the Proposed Action, in the recreation and tourism GAA. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.	**Offshore**: Alternatives C through F would reduce the number of WTG foundations and scour protection associated with the IAC. This could reduce risks associated with gear entanglement or loss if recreational activity coincides with scour protection areas. Reduced IAC installation could also negligibly decrease turbidity that could alter the behavior of species important to recreational fishing (see Section 3.9) and marine mammal sightseeing. During O&M, no impacts are anticipated because RWEC, IAC, and OSS transmission cable typically have no maintenance requirements unless a fault or failure occurs. Approximately 3,974 to 5,121 acres of anchoring and 14,157 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including Alternatives C through F. Project-related construction anchorages would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. The buried cabling would also present short-term navigational hazards. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.			
	Onshore: Onshore construction and installation of future wind facilities could affect recreation and tourism due to noise and activity at the landfall locations or along the onshore cable route if these locations intersect recreational or commercial uses. These **minor** adverse impacts would be unavoidable during construction but would be temporary and localized.	**Onshore:** Installation of onshore cables would be localized. No direct impacts to public parks, beaches, or other public recreational facilities would occur. Therefore, recreation and tourism impacts during construction would be temporary and **minor** adverse. No onshore cable maintenance would be required unless a fault or failure occurs. Therefore, cumulative, O&M, and decommissioning impacts would represent a **negligible** adverse impact on recreational users.	**Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Light	**Offshore:** Visual impacts on recreation and tourism would be short term during construction and long term during O&M, with **negligible to moderate** adverse impacts, based on the observed distance and individual responses by recreationists and visitors to changes in the viewshed.	**Offshore:** Visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2021]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Therefore, visual impacts on recreation and tourism would be temporary during construction, with **negligible** to **moderate** adverse impacts, based on the observed distance. The Proposed Action's aviation warning lighting, when visible, would add a developed/industrial visual element to views that were previously characterized by dark, open ocean during O&M. Due to the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting for the Proposed Action would result in a long-term intermittent **negligible** adverse impact on recreation and tourism. Given the distance from recreational viewers and atmospheric interference, lighting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism.	**Offshore:** Construction of offshore components would likely require less time for Alternatives C through F than anticipated for the Proposed Action, and could lead to reduced potential lighting impacts due to a smaller number of installed WTGs. Therefore, Alternatives C through F would have **negligible** to **moderate** adverse impacts. Alternatives C through F would also reduce nighttime O&M lighting as compared to the Proposed Action, due to required aviation hazard lighting of fewer WTGs, plus the two OSSs. Due to the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting would still only result in a long-term negligible adverse impact on recreation and tourism. Offshore construction activities would add new WTGs and two OSSs to the No Action Alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. New lighting from Alternatives C through F would contribute a 7% to 10% increase to in-water lighting sources from past, present, and reasonably foreseeable future projects within the GAA by introducing built visual elements to views previously characterized by dark, open ocean. Collectively, only approximately 2% to 5% of the WTG positions envisioned in the GAA would be less than 15 miles from coastal locations for any given alternative. Given the distance from recreational viewers and atmospheric interference, lighting from Alternatives C through F, when combined with past, present, and reasonably foreseeable projects, would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism.				
	Onshore: Construction of some planned future onshore projects would require new visible structures or nighttime lighting on structures that could be visible by onshore recreational users and tourists. Onshore O&M impacts from future projects would be variable based on project type) but are anticipated to be long term with variable **minor** to **moderate** adverse impacts experienced based on the observed distance.	**Onshore**: Light from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. For nighttime construction work, downward-facing portable floodlights would be used in compliance with all safety and security and local government requirements. Therefore, for most locals and tourists, any adverse impacts would be temporary, **minor**, and inconvenient but would not cause a loss to their overall experience. Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon. As such, it is anticipated that the OnSS and ICF would result in long-term **negligible** adverse lighting impacts to the recreation and tourism activities in the GAA. Construction associated with the Proposed Action could add temporary **minor** adverse light impacts experienced by onshore recreational users near the landfall work area, onshore transmission cable route, or onshore facilities or from the aviation hazard lighting on the new WTGs. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.	**Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** and temporary to long term.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Noise	**Offshore**: Pile driving is the loudest aspect of most planned future projects. Most pile driving would occur far enough offshore that that work would be inaudible from onshore locations or from typical recreational fishing locations (within 1 mile of the coast). However, pile driving and other construction noise could cause some offshore boaters and recreational fishers to avoid areas of noise-generating activity, although the loudest noise would be within the temporary safety zones (with restricted recreational and tourism vessel access) anticipated to be established for each project by offshore wind developers. Most of the anticipated offshore O&M noise from future projects would be from continuous WTG operations farther offshore. Field observations also concluded that WTG operational noise from the Block Island Wind Farm was not detectable from shore and further suggested that as wind speeds increase (causing increased ambient noise), the associated increase in operational noise of the WTG becomes less detectable (HDR 2019). Therefore, noise from offshore activities would result in temporary to long-term **minor** adverse impacts.	**Offshore**: Construction noise could result in impacts on recreation and tourism through displacement of species important to recreational fishing and sightseeing in and around construction areas, resulting in a short-term **moderate** adverse impact to fishing, shellfishing, or whale-watching activities. Offshore construction and onshore cable installation near the landfall area at Quonset Point in North Kingstown, Rhode Island, could have short-term **negligible** to **minor** adverse impacts on the recreational enjoyment of the marine and coastal environments. Offshore operational noise from the WTGs would be similar to the noise described for other projects under the No Action Alternative and would thus have long-term **minor** adverse impacts. Because of the distance from receptors, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in localized short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** adverse cumulative impacts.	**Offshore**: Alternatives C through F would negligibly decrease noise associated with pile driving for WTGs as compared to the Proposed Action, resulting in short-term **moderate** adverse impacts. Operational noise sources and levels would also be similar to, but slightly lower than the Proposed Action, resulting in long-term **minor** adverse impacts. Construction activities would add noise from pile driving for foundations proposed under Alternatives C through F, and offshore dredging for the export and inter-array cabling to the ambient noise levels of the No Action Alternative. Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones and would therefore not be expected to experience noise impacts from offshore construction. Because of the distance from receptors, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in localized, short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** cumulative impacts.			
	Onshore: Construction noise from planned future projects onshore would be variable based on project type, but many projects would include one or more noise-generating activities such as earth moving, pile driving, trenching, jackhammering, and other similar large equipment operations. Onshore O&M impacts from future projects would be variable based on project type but are anticipated to be adverse and long term with variable **minor** to **moderate** adverse impacts experienced based on the distance to the noise source.	**Onshore**: Noise from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. Therefore, for most locals and tourists, any adverse impacts would be temporary**, minor**, and inconvenient but would not cause a loss to their overall experience. Operations of onshore Project components (i.e., offshore to onshore transition joint bays, onshore transmission cable route, OnSS, and ICF) would have **negligible** adverse noise impacts intermittently over the life of the Project to onshore recreation and tourism because these components would only require periodic routine maintenance. As with lighting, construction activities would add noise from the construction of onshore facilities to the ambient noise levels of the No Action Alternative. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.	**Onshore**: Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** and temporary to long term.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	**Offshore**: Recreational impacts associated with in-water structures would include the risk of recreational vessel allision and collision, fishing gear entanglement, vessel damage or loss, increased navigation hazards, and visual impacts: The impact of visible structures on recreation would be long term and **moderate** adverse but unlikely to impact shore-based or marine recreation and tourism in the GAA as a whole.	**Offshore**: Offshore structures would impact recreation and tourism through increased navigational complexity, risk of allision or collision, attraction of recreational vessels to offshore wind structures for fishing and sightseeing, increased risk of fishing gear loss or damage by entanglement due to scour or cable protection, and potential difficulties in anchoring over scour or cable protection. Revolution Wind would minimize these **minor** to **moderate** adverse impacts through the navigation- and fishing-related EPMs listed in Appendix F. Based on the duration of Project activity and observed distance, visual contrast associated with the Proposed Action could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. Additionally, construction of offshore Project components could elicit a long-term **minor** beneficial impact through an increase in curiosity, recreational fishing and diving activity. New structures related to the Proposed Action would noticeably increase navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; viewshed changes; and difficulty anchoring over scour and cable protection. However, new in-water structures from the Proposed Action could benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism.	**Offshore**: Alternatives C through F would reduce the number of WTGs, potentially allowing for improved maneuverability for recreational vessels through the Lease Area. The Habitat Alternative could also negligibly reduce visual impacts as compared to the Proposed Action, depending on the observable distance and individual responses to a view of offshore wind farms (see Section 3.20 for details). Alternatives C through F would add foundations to the 953 foundations estimated for the No Action Alternative within the GAA. New structures would add to the long-term impacts on recreation and tourism throughout the life of the Project (up to 35 years, plus up to an additional 2 years for decommissioning) by increasing navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; and difficulty anchoring over scour and cable protection. Based on visual simulations from onshore locations, some seaside locations could experience reduced recreational and tourism activity as a result of visible in-water structures, but the visibility of large offshore structures is not expected to impact shore-based recreation and tourism as a whole. New in-water structures could also benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism.			
	Onshore: Not applicable	**Onshore**: Inland residential/commercial areas and recreational sites would generally be screened from construction views due to the presence of existing development combined with forested areas (see COP Appendix U1). Therefore, any adverse impacts to overall recreator experience would be temporary and **minor** adverse impacts, but would not cause a loss to the overall recreator experience. The proposed OnSS and ICF would not be out of scale or character with the existing types of development currently present in the vicinity, such as the existing Davisville Substation or the structures at nearby Quonset Business Park. As such, it is anticipated that O&M of the OnSS and ICF would result in **negligible** adverse visual impacts to recreation and tourism activities in the GAA. New onshore structures would only result in **minor** adverse visual impacts experienced by recreational users due to the existing settings at these locations. When considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in temporary **negligible** to **minor** adverse cumulative visual impacts on recreation and tourism.	**Onshore:** Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **negligible** to **minor** adverse and temporary to long term.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Vessel traffic	**Offshore**: Future projects would generate increased nearshore and offshore vessel traffic, primarily during construction, along routes between ports and the offshore wind construction areas. Although long-term increased traffic volumes from O&M of future projects would be low, they would add to existing in-water vessel traffic and therefore present **minor** long-term adverse impacts on recreational users.	**Offshore**: Construction would result in as many as 61 construction vessels per construction day in 2023 and 2024 present at offshore work areas on a daily basis. However, the majority of recreational boating occurs within 1 nm of shore. Therefore, most recreational boaters in the GAA would experience a temporary **minor** adverse inconvenience from construction-related vessel traffic. The estimated low volume of O&M vessel traffic would not be anticipated to affect ongoing recreational use. O&M of the Proposed Action would therefore have **negligible** adverse impacts on onshore or offshore recreation and tourism. Project vessels would add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving construction-related vessels while in transit. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.	**Offshore**: Construction of offshore components would likely require less time for Alternatives C through F than anticipated for the Proposed Action, and could lead to reduced potential navigational impacts for recreational users due to a smaller number of WTGs. Therefore, Alternatives C through F would have **negligible** to **minor** adverse impacts.			
	Onshore: Future projects could increase onshore vehicle traffic or alter traffic patterns in a manner that inconveniences recreational users, primarily during construction near port facilities and on adjacent, existing roadways. Although long-term increased traffic volumes from O&M activities of future projects would be relatively low, they would add to the existing onshore traffic and therefore present **minor**, localized long-term adverse impacts on recreational users.	**Onshore**: No public parks, beaches, or other public recreational facilities are immediately adjacent to the onshore route, OnSS, or ICF. Additionally, Revolution Wind would coordinate with local authorities during onshore construction to minimize local traffic impacts. Therefore, any adverse impacts to tourism or overall recreator experience would be temporary to long term and **minor** adverse.	**Onshore**: Alternatives C through F would not impact onshore activities; therefore, impacts would be the same as those described for the Proposed Action: **minor** and temporary to long term.			

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3.18.2.2 Alternative B: Impacts of the Proposed Action Alternative on Recreation and Tourism

3.18.2.2.1 Construction and Installation

Offshore Activities and Facilities

During construction, recreational offshore uses such as boating, fishing, diving, and wildlife and whale watching could be adversely impacted by Project activities. Detailed analysis by IPF is provided below. Construction EPMs would be implemented to minimize adverse impacts to recreators as practicable (see Table F-1 in Appendix F), including communication with vessel operators and implementation of ADLS.

Anchoring and new cable emplacement/maintenance: Anchoring could occur anywhere within the maximum work area under the Proposed Action, although impacts would be localized to specific anchoring sites and would be temporary in duration. The presence of as many as 61 construction vessels per construction day in 2023 and 2024 would increase navigation complexity for recreational vessels, requiring individual boats to navigate around Project vessels and work areas (see COP Table 3.3.10-2). Increased turbidity from anchoring could also briefly alter the behavior of species important to recreational fishing (see Section 3.9) and marine mammal sightseeing. However, temporary safety zones around each WTG site and each cable-laying vessel (anticipated to be established and monitored by Revolution Wind) would minimize potential conflicts for recreational uses. Anchoring activities would also be localized; therefore, construction impacts would represent a temporary, **minor** adverse impact on recreational users. Proposed Action anchoring impacts to fish species used for recreational fishing are addressed in Section 3.9.

Up to 4,009 acres of seafloor disturbance could occur from Proposed Action IAC and export cable installation within the recreation and tourism GAA. Installation of offshore cables would temporarily restrict recreation access within the cable routes. Recreational vessels traveling near the cable routes would also need to navigate around construction vessels. Revolution Wind would implement a comprehensive communication plan during offshore construction to inform all mariners, including commercial and recreational fishermen and recreational boaters, of construction activities and vessel movements. Communication would be facilitated through a fisheries liaison, a Project website, and public notices to mariners and vessel float plans (in coordination with the USCG). Therefore, potential changes in navigation routes due to Proposed Action construction would constitute a temporary, **minor** adverse impact.

Cable installation could also affect fish and mammals of interest for recreational fishing and sightseeing through dredging and turbulence, although no population-level impacts are expected (see Sections 3.13 and 3.9), resulting in short-term and **minor** adverse impacts on recreation and tourism.

Light: The Proposed Action would require nighttime lighting for construction vessels traveling to and working at the Project's offshore construction areas that could be visible by recreational users and tourists. The visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2021]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Therefore, visual impacts on recreation and tourism would be temporary during construction, with **negligible** to **moderate** adverse impacts, based on the observed distance.

Noise: Construction noise could result in impacts on recreation and tourism through displacement of species important to recreational fishing and sightseeing in and around construction areas, resulting in a short-term **moderate** adverse impact to fishing, shellfishing, or whale-watching activities. Pile driving represents the loudest likely noise source during construction activities. Installation of a single monopile foundation is estimated to normally require 1 to 4 hours (6 to 12 hours maximum) of pile driving; up to three WTG monopile foundations would be installed in a 24-hour period. Therefore, recreational boaters near the RWEC and WTGs could also be temporarily inconvenienced by pile-driving noise.

Offshore construction and onshore cable installation near the landfall area at Quonset Point in North Kingstown, Rhode Island, could have short-term **negligible** to **minor** adverse impacts on the recreational enjoyment of the marine and coastal environments. This landing site is developed for military and industrial use; however, the closest public recreation area, Blue Beach, is located approximately 500 feet to the southwest of the Project's landfall envelope. Compass Rose Beach, another public beach, and Martha's Vineyard Fast Ferry are also located approximately 2,600 feet east of the southeast corner of the landfall envelope. Recreational users at these locations could experience temporary adverse impacts due to construction noise, if these noise levels exceed ambient noise conditions generated by ongoing industrial and port activities.

Presence of structures: The installation of up to 102 Project foundations are proposed within the recreation and tourism GAA. As also noted under the No Action Alternative, these offshore structures would impact recreation and tourism through increased navigational complexity, risk of allision or collision, attraction of recreational vessels to offshore wind structures for fishing and sightseeing, increased risk of fishing gear loss or damage by entanglement due to scour or cable protection, and potential difficulties in anchoring over scour or cable protection. Revolution Wind would minimize these **minor** to **moderate** adverse impacts through the navigation- and fishing-related EPMs listed in Appendix F. As part of these EPMs, Revolution Wind would establish temporary safety zones around construction areas and work with the USCG to communicate these zones and other work areas to the boating public via local Notices to Mariners. Additionally, the majority of recreational boating would occur more than 10 miles from Proposed Action WTGs and OSSs.

WTG and OSS construction could also affect recreation and tourism through visual impacts. During construction, offshore boaters and visitors on the coastline would see the upper portions of tall equipment such as mobile cranes. This equipment would move from turbine to turbine as construction progresses and thus would not be long-term fixtures.

Further, a survey-based study of 1,725 participants who typically visit the coast suggested that (based on visual simulations for prospective offshore wind facilities) only 10% of respondents would experience adverse visual impacts at a distance of 10 miles from shore (Parsons and Firestone 2018). The study suggests that coastal visitors could experience adverse reactions approaching 0% from Project WTGs at approximately 25 to 30 miles offshore. Based on the duration of construction activity and observed distance, visual contrast associated with the Proposed Action would have a temporary **negligible** adverse impact on recreation and tourism. Additionally, construction of offshore Project components could elicit a temporary beneficial impact through an increase in curiosity visits by individuals interested in WTG construction (Parsons and Firestone 2018).

Vessel traffic: Construction would result in as many as 61 construction vessels per construction day in 2023 and 2024 present at offshore work areas (see COP Table 3.3.10-2) on a daily basis. This increase in

vessel volume for the Proposed Action would contribute to increased vessel traffic and associated vessel collision risk along routes between ports and the offshore construction areas if recreational boaters cross or approach cable and WTG locations. However, the majority of recreational boating occurs within 1 nm of shore (Starbuck and Lipsky 2013). Therefore, most recreational boaters in the GAA would experience a temporary, **minor** adverse impact from construction-related vessel traffic.

Onshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: No anchoring impacts would occur as a result of onshore activities. Although onshore construction and installation would occur at the landing site during installation of the cable onshore/offshore transition vaults and during HDD or trenching in preparation for joining the onshore and offshore cables, the landfall work area is developed for non-recreational purposes. The Quonset Point Naval Air Station property is currently the home of the 143rd Airlift Wing of the Rhode Island Air National Guard and is in use as both a military base and a public airport with two active runways. A portion of the base has been converted into a business park. The onshore cable route would follow Circuit Drive and Camp Avenue to the OnSS. No public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route. However, the route travels through the Wickford Historic District, which is primarily a residential community with some commercial buildings that support a seasonal recreation economy. Three potential recreation opportunities—the Wickford Village/Harbor State Scenic Area, the Quonset-Martha's Vineyard Ferries, and Narraganset Bay—are also located in the vicinity. Additionally, as noted above, two public beaches—Blue Beach and Compass Rose Beach—are within 500 to 2,600 feet of the landfall envelope. However, installation of onshore cables would be localized. No direct impacts to public parks, beaches, or other public recreational facilities would occur. Therefore, recreation and tourism impacts during construction would be temporary and **minor** adverse.

Light and Noise: Light and noise from onshore construction activities could temporarily adversely impact the recreation experience of users if present or traveling on roads near the landing site, onshore cable route, and proposed onshore facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are within or immediately adjacent to this onshore route, OnSS, or ICF. Additionally, the onshore construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day. The majority of onshore construction would be completed during daytime hours. Revolution Wind would generally comply with North Kingstown's noise ordinance; however, certain construction tasks such as concrete pours, HDD and landfall installation, and cable pulling or splicing, once started, would be continued through to completion. For nighttime construction work, downward-facing portable floodlights with a maximum height of approximately 18 feet would be used in compliance with all safety and security and local government requirements. Therefore, for most locals and tourists, any adverse impacts would be temporary **minor** impacts, but would not cause a loss to their overall experience.

Presence of structures: A new OnSS and ICF adjacent to the existing Davisville Substation would be constructed to support interconnection of the Project to the existing electrical grid. Vegetation clearing and taller equipment (e.g., cranes) would be visible from certain vantage points during construction of these onshore structures. However, inland residential/commercial areas and recreational sites would generally be screened from construction views due to the presence of existing development combined with forested areas (see COP Appendix U1). Therefore, any adverse impacts to overall recreator

experience would be temporary and **minor** adverse impacts, but would not cause a loss to the overall recreator experience.

Vessel traffic: Vehicle and equipment traffic from onshore cable construction activities could temporarily adversely impact the recreation experience of users if present or travelling on roads near the landing site and onshore cable route and facilities. However, as previously noted, no public parks, beaches, or other public recreational facilities are immediately adjacent to the onshore route, OnSS, or ICF. Additionally, Revolution Wind would coordinate with local authorities during onshore construction to minimize local traffic impacts. Therefore, any adverse impacts to tourism or overall recreator experience would be temporary and **minor** adverse.

3.18.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: During the O&M, a limited number of vessels would be present in the Lease Area or RWEC at any one time. Potential anchoring impacts would be similar to the construction phase, but reduced due to fewer anchored vessels. No cable impacts are anticipated as the RWEC, IAC, and OSS transmission cable typically have no maintenance requirements unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, O&M and decommissioning impacts would represent a temporary **minor** adverse impact on recreational users. Proposed Action anchoring and cable impacts to fish species used for recreational fishing are addressed in Section 3.9.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Light: During operations, the Proposed Action would contribution to nighttime lighting due to required aviation hazard lighting of up to 102 WTGs and OSSs. The visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2021]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more, and that only 3% of the land area within the visual study area would contain views of the Project. Revolution Wind has also committed to implement ADLS (as described in Appendix F) as a measure to reduce the duration of lighting impacts. As noted in Section 3.20, the Proposed Action's aviation warning lighting, when visible, would add a developed/industrial visual element to views that were previously characterized by dark, open ocean. Due to the limited duration and frequency of such events and the distance of WTGs from shore, however, visible aviation hazard lighting for the Proposed Action would result in a long-term intermittent **negligible** adverse impact on recreation and tourism.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Noise: Noise from O&M (predominately WTG operations) could result in impacts on recreation and tourism. Offshore operational noise from the WTGs would be similar to the noise described for other projects under the No Action Alternative and would thus have long-term **minor** adverse impacts. Impacts during decommissioning would be similar to the impacts during construction and installation.

Presence of structures: During O&M of the Proposed Action, the permanent presence of WTGs would create obstacles for recreational vessels. At their lowest point, WTG blades would be 94 feet above the

surface. At this height, larger sailboats would need to navigate around the Lease Area, while smaller vessels could navigate through the Lease Area but would still need to adjust routes to bypass WTGs and OSS foundations. No restrictions on fishing or other recreational pursuits would occur during Project operations. However, some recreational anglers could avoid fishing in the Lease Area due to concerns about their ability to safely fish within or navigate through the area.

For recreational anglers harvesting HMS such as tunas, sharks, and billfish, the spacing of the WTGs could impact access to fishing locations. The fishing methods used and the size, strength, and swimming speed of these larger species require significantly more space for fishing compared to other species; as a result, the proposed separation between WTGs could be insufficient for this type of fishing. Anglers who do fish within the Lease Area would need to change their methods (i.e., they would not be able to allow their boats to drift and would need to correct course to avoid WTGs). See Section 3.9 for analysis on for-hire fishing impacts.

The presence of WTGs would also require the USCG to adjust their search and rescue planning and search patterns to allow aircraft to fly within the GAA, potentially leading to a less-optimized search pattern and a lower probability of success for lost or hurt recreationists (see Section 3.17).

The Proposed Action's WTGs would also affect recreation and tourism through visual impacts. When visible (i.e., on clear days in locations with unobstructed ocean views), WTGs would add a developed/industrial visual element to ocean views that were previously characterized by open ocean, broken only by transient vessels and aircraft passing through the view. However, the visual impact assessment prepared for Revolution Wind (see COP Appendix U3 [EDR 2021]) determined that the Project would not likely be easily detectable when viewed from a distance of 20 miles or more and that only 3% of the land area within the visual study area would contain views of the Project. Revolution Wind has voluntarily committed to use ADLS and non-reflective pure white or light gray paint color, as described in Appendix F to reduce impacts.

The visual contrast created by the WTGs could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's orientation, activity, and purpose for visiting the area. As discussed in Section 3.18.1, research suggests that at a distance of 15 miles, few beach visitors (only 6%) would select a different beach based on the presence of offshore wind turbines. An estimated 55 WTGs would fall within this distance, based on the proposed Project array. Considering these factors, BOEM expects the impact of visible WTGs on the use and enjoyment of recreation and tourist facilities and activities during O&M of the Proposed Action Alternative to be long term and **minor** adverse. While some visitors to south-facing coastal or elevated locations could alter their behavior, this changed behavior is unlikely to meaningfully affect the recreation and tourism industry as a whole. Additionally, increased beach visitation by individuals who view the WTGs as positive would offset some lost trips from visitors who consider views of WTGs to be negative (Parsons and Firestone 2018).

Overall, the impacts on most recreational pursuits would be long term but **minor** adverse, while the impact on for-hire fishing would be **moderate** adverse because these enterprises are more likely to be materially affected by displacement, competition for resources, and longer transit times in a manner similar to commercial fishing businesses.

Conversely, charter cruises could also choose to market the operational WTGs as a tourist destination, although their distance from shore could limit some interest. Scour protection around the WTG

foundations would likely attract forage fish as well as game fish, which could provide new opportunities for certain recreational anglers. A 1989 survey of recreational fishermen and divers in the Gulf of Mexico found that fishermen were willing to travel up to 45 nm offshore and divers 77 nm offshore to visit abandoned platforms that have been reefed (Stanley and Wilson 1989). A subsequent 2002 study (Hiett and Milon 2002) also found that that there is substantial recreational activity associated with the presence of oil and gas structures in the Gulf of Mexico from Alabama through Texas. These structures range from directly offshore in 10-foot water depths to complex facilities in water depths up to almost 10,000 feet at more than 80 miles from shore (NOAA 2021). The report estimated a total of $324.6 million in economic output in coastal counties of the Gulf region associated with fishing and diving activities near oil and gas structures. A survey of United Kingdom offshore recreational fishermen by Hooper et al. (2017) found that respondents frequently fished at offshore wind farms, with a mean distance from shore of 10 nm. Approximately one quarter of the respondents reported having fished within or around the perimeter of wind farms. Likewise, evidence from Block Island Wind Farm indicates an increase in recreational fishing near the WTGs (Smythe et al. 2018). These surveys suggest that the Project could attract recreational fishing and diving activity, providing a long-term **minor** benefit. The Project could also increase tourism activity during peak tourism months (Carr-Harris and Lang 2019).

Impacts during decommissioning would be similar to the impacts during construction and installation.

Vessel traffic: For regularly scheduled maintenance and inspections, Revolution Wind anticipates that, on average, up to nine crew transfer vessels or service operation vessels would operate in the Lease Area. In other maintenance or repair scenarios, additional vessels could be required. However, this low volume of vessel traffic would not be anticipated to affect ongoing recreational use. O&M of the Proposed Action would therefore have **negligible** adverse impacts on onshore or offshore recreation and tourism.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Onshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: No anchoring impacts would occur as a result of onshore activities. No onshore cable maintenance would be required unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, O&M and decommissioning impacts would represent a **negligible** adverse impact on recreational users.

Light: Based results of the viewshed analysis (see COP Appendix U1 [EDR 2021]), portions of the lightning masts for OnSS and ICF features could be visible from some views. However, lighting at these facilities would be limited to yard and task lighting for emergency maintenance or repairs. Both categories would be switched lights and only in use if staff are present. Operational lighting for the OnSS and ICF would comply with Quonset Development Corporation lighting regulations and be mounted with the lamp horizontal to the ground (light facing straight down) or with a lamp tilt no more than 25 degrees from the horizon. As such, it is anticipated that the OnSS and ICF would result in **negligible** adverse lighting impacts to the recreation and tourism activities in the GAA. Impacts during decommissioning would be similar to the impacts during construction and installation.

Noise: Operations of onshore Project components (i.e., offshore to onshore transition joint bays, onshore transmission cable route, OnSS, and ICF) would have **negligible** adverse noise impacts intermittently

over the life of the Project to onshore recreation and tourism because these components would only require periodic routine maintenance.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Presence of structures: Based on results of the viewshed analysis (see COP Appendix U1 [EDR 2021]), it is anticipated that the OnSS and ICF could be visible from approximately 15% of the viewshed analysis area. However, the presence of existing landscape vegetation along roadways could further reduce the extent of visual impacts. For more distant views from Wickford Historic District and Wickford Harbor/Wickford Village State Scenic Area, and Narragansett Bay, visibility would only include the upper portions of a few proposed transmission structures. However, where visible at foreground distances, the proposed OnSS and ICF could introduce new industrial/utility structures into the landscape. Nevertheless, the proposed OnSS and ICF would not be out of scale or character with the existing types of development currently present in the vicinity, such as the existing Davisville Substation or the structures at nearby Quonset Business Park. As such, it is anticipated that the OnSS and ICF would result in **negligible** adverse visual impacts to recreation and tourism activities in the GAA.

Impacts during decommissioning would be similar to the impacts during construction and installation.

Vessel traffic: Potential traffic impacts would be similar to the construction phase but likely reduced due to fewer equipment and vehicle trips. Impacts during decommissioning would be similar to the impacts during construction and installation: temporary and **minor** adverse.

3.18.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: Up to approximately 5,338 acres of anchoring and 14,157 acres of cabling seafloor disturbance could occur from ongoing and planned actions, including the Proposed Action, in the recreation and tourism GAA. Project-related construction anchorages would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. The buried cabling would also present short-term navigational hazards. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.

Light: New lighting from the Proposed Action would contribute to a 11% increase in in-water lighting sources from past, present, and reasonably foreseeable future projects within the GAA by introducing built visual elements to views previously characterized by dark, open ocean. Collectively, 9% of the WTG positions envisioned in the GAA would be less than 15 miles from coastal locations with views of the WTGs.

Given the distance from recreational viewers and atmospheric interference, lighting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term intermittent **minor** adverse cumulative impacts on recreation and tourism.

Noise:. Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones and would therefore not be expected to experience

noise impacts from offshore construction. Because of the distance from receptors, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in localized short-term **minor** to **moderate** adverse cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term **negligible** adverse cumulative impacts.

Presence of structures: The Proposed Action would noticeably add up to 102 foundations to the 953 foundations estimated for the No Action Alternative within the GAA. New structures related to the Proposed Action would add to the long-term impacts on recreation and tourism throughout the life of the Project (up to 35 years, plus up to an additional 2 years for decommissioning) by increasing navigational complexity; risks of structure allision; route adjustments for races, sightseeing, and fishing; loss and damage of fishing gear to scour and cable protection; and difficulty anchoring over scour and cable protection. However, new in-water structures from the Proposed Action could benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** to **moderate** adverse and long-term **minor** beneficial cumulative impacts on recreation and tourism.

Construction and O&M of the Project would also noticeably increase the visual impacts on recreational and tourism users by adding up to 100 WTGs and two OSSs to the No Action Alternative. Based on visual simulations described in Sections 3.18.1.1, 3.18.2.2.1, and 3.18.2.2.2, the visibility of large offshore structures is not expected to impact shore-based recreation and tourism as a whole. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would be short term and **minor** adverse for onshore viewers at sensitive viewing locations because of the distance and natural atmospheric interference. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would be short term **minor** to **moderate** adverse for offshore recreational users and would increase as users approach the WTGs. Impacts to viewers at sensitive viewing locations are addressed in Section 3.20.

Vessel traffic: Project vessels would noticeably add to disturbances of marine species and their habitats important to recreational fishing and could require recreational and tourism vessels to navigate around moving construction-related vessels while in transit. However, non-Project traffic would be able to adjust routes and avoid the work area and transiting construction vessels. BOEM estimates a peak of 276 vessels at sea on a daily basis due to offshore wind project construction and O&M over a 10-year time frame, with most of these vessels remaining in the vicinity of their respective lease areas. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short-term and long-term **minor** adverse cumulative impacts on recreation and tourism.

Onshore Activities and Facilities

Anchoring and new cable emplacement/maintenance: No anchoring impacts would occur as a result of onshore activities. No onshore cable maintenance would be required unless a fault or failure occurs. If cable repair or replacement or remedial cable protection is required, maintenance activities would be limited to the disturbance corridors previously defined for construction. Therefore, the Proposed Action

when combined with past, present, and reasonably foreseeable projects would result in temporary **negligible** adverse cumulative impacts to onshore recreation and tourism.

Light: Construction associated with the Proposed Action could add temporary minor adverse light impacts experienced by onshore recreational users near the landfall work area, onshore transmission cable route, or onshore facilities or from the aviation hazard lighting on the new WTGs. Long-term increases in operational lighting from the Proposed Action would be **negligible** adverse. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

Noise: As with lighting, construction activities would add noise from the construction of onshore facilities to the ambient noise levels of the No Action Alternative. Onshore construction noise would be localized to the source, short term **minor** to **moderate** adverse, depending on the distance of the receptor from the source. Long-term increases in operational noise from the Proposed Action would be **negligible** adverse. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

Presence of structures: Onshore construction and installation would add an O&M facility, an interconnection facility, and an OnSS to the No Action Alternative. These new onshore structures would only result in **minor** adverse visual impacts experienced by recreational users due to the existing settings at these locations (see Section 3.20 for details on potential visual impacts). When considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in temporary **negligible** to **minor** adverse cumulative visual impacts on recreation and tourism.

Vessel traffic: Construction vehicles associated with the Proposed Action could add traffic delays experienced by recreational travelers on local roadways. Long-term increases in operational traffic from the Proposed Action would be **negligible** adverse. Therefore, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in temporary **minor** adverse cumulative impacts to onshore recreation and tourism.

3.18.2.2.4 Conclusions

Project construction and installation and decommissioning would introduce noise, lighting, human activity, vehicles and vessels (increasing potential collision risk), and interruption to access points in the GAA. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and decommissioning. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse and short term to long term. Project activities are expected to contribute to several IPFs, the most prominent being noise and vessel traffic during construction and the presence of offshore structures during operations. Noise and vessel traffic would have impacts on visitors, who may avoid onshore and offshore noise sources and vessels, and impacts on recreational fishing and sightseeing as a result of the impacts on fish, invertebrates, and marine mammals. BOEM expects the overall impact on recreation and tourism from the Proposed Action alone to be **minor** adverse; however, the overall effect would be small, and recreation and tourism would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate**

adverse and **minor** beneficial. Impacts would result from short-term impacts during construction: noise, anchored vessels, and hindrances to navigation; and the long-term presence of cable hard cover and structures in the GAA during operations, with resulting impacts on recreational vessel navigation and visual quality. Beneficial impacts would result from the reef effect and sightseeing attraction of offshore wind energy structures. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action, when combined with past, present, and reasonably foreseeable activities, would result in **minor** adverse impacts and **minor** beneficial impacts to recreation and tourism. The overall effect would be small, and recreation and tourism would be expected to recover completely with no mitigating action required.

3.18.2.3 Alternatives C, D, E, and F

Table 3.18-2 provides a summary of IPF findings for these alternatives.

3.18.2.3.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and associated IACs, the presence of WTGs could still increase congestion, space conflicts, navigation risks, and the potential for collision, albeit at lower levels than the Proposed Action. The reduced number of WTGs under these alternatives could provide a long-term beneficial impact for some recreational viewers. Therefore, BOEM expects that the impacts resulting from each alternative alone would range from **negligible** to **moderate** adverse.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that each alternative's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **minor** beneficial). The overall impacts of each alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same as those under the Proposed Action: **minor** adverse and **minor** beneficial.

3.18.2.4 Mitigation

If BOEM requires potential additional mitigation measures identified in Table F-2 of Appendix F, such as developing a navigation safety plan and developing a construction schedule that minimizes overlap with recreational fishing tournaments and other important seasonal recreational fishing events, minor and short-term adverse impacts for local residents who recreate offshore would be further reduced.

3.19 Sea Turtles

3.19.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Sea Turtles

Geographic analysis area: The sea turtles GAA is described in Appendix G and illustrated in Figure 3.19-1. The intent of the GAAs used in this EIS is to define a reasonable boundary for assessing the potential effects, including cumulative effects, resulting from the development of an offshore wind energy industry on the mid-Atlantic OCS. GAAs for marine biological resources are necessarily large because marine populations range broadly and cumulative impacts can be expressed over broad areas. GAAs are not used as a basis for analyzing the effects of the Proposed Action, which represent a subset of these broader effects and expressed over a smaller area. These impacts are analyzed specific to each IPF. The GAA for sea turtles comprises the Northeast Shelf and Southeast Shelf Large Marine Ecosystems, as shown in Figure 3.19-1. This broad area captures the typical movement range within U.S. waters of most sea turtles that could occur within the Project vicinity during the construction and installation, O&M, and decommissioning of the Project. Thus, while Project-related impacts to sea turtle habitat are restricted to a relatively small GAA, the GAA for Project impacts to sea turtles is necessarily large due to their movement range.

Affected environment: Four species of sea turtles are known to occur in or near the proposed RWF and RWEC, and all are protected species under the ESA. These are the green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The potential impacts of the Proposed Action to these species are assessed in Section 3.19.2. The hawksbill sea turtle (*Eretmochelys imbricata*) is also protected under the ESA but is exceedingly rare in the Project vicinity (Kenney and Vigness-Raposa 2010) (see Figure 3.19-1). The proposed RWF and RWEC is considered outside the normal range of hawksbill turtles, which range predominantly in warmer waters to the south. Individual hawksbill turtles have occasionally occurred in and near the southern New England area after being stunned by exposure to unusual cold-water events and subsequently transported northward by the Gulf Stream into the region. These occurrences are not representative of normal behaviors or distribution. Similarly, while this species does occur in the GAA for sea turtles (defined in Appendix E), the Proposed Action is unlikely to contribute to any measurable cumulative effects, and hawksbill sea turtles are therefore not considered further in this EIS.

Sea turtles primarily inhabit tropical and subtropical seas throughout the world, with several species seasonally ranging into temperate zones to forage. Sea turtles are morphologically adapted for continuous swimming, and they can remain underwater for extended periods, ranging from several minutes to several hours, depending on factors such as daily and seasonal environmental conditions and specific behavioral activities associated with dive types (Hochscheid 2014; National Science Foundation [NSF] and USGS 2011). These adaptations are important because sea turtles often travel long distances between their feeding grounds and nesting beaches (Meylan 1995). There are no nesting beaches or other designated critical habitats in the vicinity of the RWF (Greater Atlantic Regional Fisheries Office [GARFO] 2020), meaning that individuals occurring in the proposed RWF and RWEC are either migrating or foraging. As such, these individuals likely spend the majority of time below the surface, although specifics are species dependent. Underwater observations of 73 sea turtles with 2,742 minutes of video in the mid-Atlantic

found that loggerhead sea turtles were within the near-surface region of the water column a median of 42% of the time (Patel et al. 2016).

The combination of sightings, strandings, tag, and bycatch data provides the best available information on sea turtle distribution. This section summarizes data from sightings and surveys of the waters around the Lease Area (Kraus et al. 2016), the NMFS Sea Turtle Stranding and Salvage Network (STSSN) (NMFS STSSN 2020), recent available density estimates (Denes et al. 2020a), and historic regional data (Kenney and Vigness-Raposa 2010). Denes et al. (2020a) compiled estimated seasonal densities for Kemp's ridley, leatherback, and loggerhead sea turtles in the GAA using data obtained from U.S. Navy Operating Area Density Estimates and Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP) databases (Halpin et al. 2009; Navy 2007, 2012). Green sea turtle densities were not estimated because suitable data for the region are limited. Table 3.19-1 summarizes potential sea turtle occurrence in the southern New England coastal waters off Rhode Island and Massachusetts. Potential effects to sea turtles, which are discussed in Section 3.19.2, are based on the likelihood of occurrence.

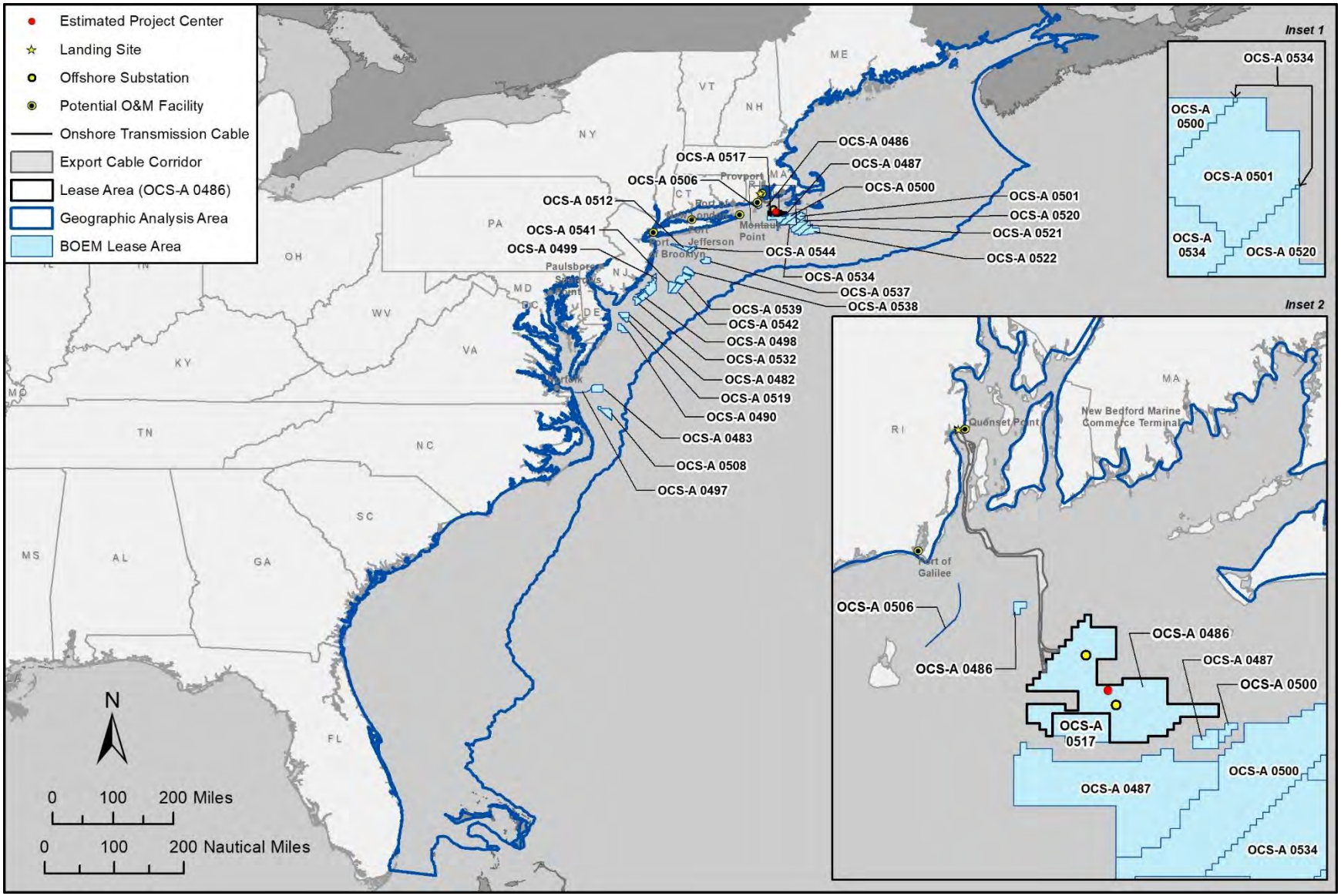

Figure 3.19-1. Geographic analysis area for sea turtles.

Table 3.19-1. Frequency of Sea Turtle Species Occurrence in the Revolution Wind Farm and Revolution Wind Export Cable

Common Name	Scientific Name	Distinct Population Segment*/Population	Endangered Species Act Status‡	Frequency of Occurrence†, ¶	Seasonal Occurrence‡,§	Likelihood of Occurrence§,¶	Included in Impact Analysis?
Green sea turtle	*Chelonia mydas*	North Atlantic	T	Uncommon, limits of range	May to November	Unlikely/ uncommon	Yes
Hawksbill sea turtle	*Eretmochelys imbricata*	Throughout range	E	Rare, outside range	May to November	Exceedingly unlikely	No, outside limits of range
Leatherback sea turtle	*Dermochelys coriacea*	Atlantic‡‡	E	Common	May to November	Likely	Yes
Loggerhead sea turtle	*Caretta caretta*	Northwest Atlantic	T	Common	May to November	Likely	Yes
Kemp's ridley sea turtle	*Lepidochelys kempii*	Throughout range	E	Regular	May to November	Likely but infrequent	Yes

Notes: Data from NMFS STSSN (2020).

* DPS = distinct population segment, E = endangered, T = threatened.

† Data from Kenney and Vigness-Raposa (2010). Common = fewer than 100 observations, regular = 10–100 observations; rare = fewer than 10 observations.

‡ Data from GARFO (2020).

§ Data from NEFSC and SEFSC (2018).

¶ Based on observations by Kraus et al. (2013, 2014, 2016), O'Brien et al. (2020, 2021a, 2021b), and Quintana et al. (2019).

‡‡ A Northwest Atlantic DPS to be listed as threatened has been proposed for leatherback sea turtles (85 *FR* 48332). The Atlantic population considered herein includes this proposed DPS.

Green sea turtle: Green sea turtles are found in tropical and subtropical waters around the globe. They are most commonly observed feeding in the shallow waters of reefs, bays, inlets, lagoons, and shoals that are abundant in algae or marine grass (NMFS and USFWS 2007). In U.S. waters, they are typically found in the Gulf of Mexico or coastal waters south of Virginia (USFWS 2021). Juveniles and subadults are occasionally observed in Atlantic coastal waters as far north as Massachusetts (NMFS and USFWS 1991), including the waters of Long Island Sound and Cape Cod Bay (Cetacean and Turtle Assessment Program 1982). The species' primary nesting beaches are located in Costa Rica, Mexico, the United States (Florida), and Cuba. According to Seminoff et al. (2015), nesting trends are generally increasing for this population. Based on feeding and habitat preferences, the species is less likely to occur in the RI/MA WEA and MA WEA. Kenney and Vigness-Raposa (2010) recorded one confirmed sighting within the RI/MA WEA in 2005. The STSSN reported one offshore and 20 inshore green sea turtle strandings between 2017 and 2019, and green sea turtles are found each year stranded on Cape Cod beaches (NMFS STSSN 2020; Wellfleet Bay Wildlife Sanctuary [WBWS] 2018). Five green turtle sightings were recorded off the Long Island shoreline 10 to 30 miles southwest of the RI/MA WEA in aerial surveys conducted from 2010 to 2013 (NEFSC and SEFSC 2018), but none were positively identified in multiseason aerial surveys of the RI/MA WEA from October 2011 to June 2015 (Kraus et al. 2016). Because of the limited number of sightings, uncertainty regarding survey method effectiveness, and difficulties observing juveniles, it is not possible to develop precise occurrence probability or density estimates for this species, but occurrence in the RWF and RWEC is expected to be uncommon and limited to small numbers.

Leatherback sea turtle: The leatherback is the most globally distributed sea turtle species, ranging broadly from tropical and subtropical to temperate regions of the world's oceans (NMFS and USFWS 1992). Leatherbacks are a pelagic species, but they are commonly observed in coastal waters along the OCS (NMFS and USFWS 1992). The breeding population estimate (total number of adults) in the North Atlantic is 34,000 to 95,000, and, aside from the western Caribbean, nesting trends at all other Atlantic nesting sites are generally stable or increasing (NMFS and USFWS 2013; Turtle Expert Working Group 2007). Atlantic Marine Assessment Program for Protected Species surveys conducted from 2010 through 2013 routinely documented leatherbacks in New England waters, including the RI/MA WEA, during the summer months (NEFSC and SEFSC 2018). Kraus et al. (2016) recorded 153 observations in monthly aerial surveys, all between May and November, with a strong peak in August. Monthly aerial surveys on the New York Bight from 2017 through 2020 documented a total of 37 leatherback sea turtles, with an additional 503 unidentified sea turtles observed (Tetra Tech and LGL Ecological Research Associates, Inc. 2020). During the summer (June–August) and fall (September–November) months; leatherback density within the RI/MA WEA (refer to Figure 1.1-2) was estimated to be 0.0063 animals per km^2 and 0.0087 animals per km^2, respectively, compared to densities of effectively zero for the rest of the year (Kusel et al. 2021). The STSSN reported 19 offshore and 77 inshore leatherback sea turtle strandings between 2017 and 2019, the highest number among all turtle species reported (NMFS STSSN 2020). Kraus et al. (2016) data indicated that leatherbacks would be the most abundant sea turtle species in the RWF and RWEC, which is consistent with the other information on sea turtle occurrence in the vicinity presented here. Based on this information, leatherback sea turtles are expected to occur commonly in the RWF and RWEC between May and November, with the highest probability of occurrence from July through October (Sherrill-Mix et al. 2008).

Loggerhead sea turtle: Foraging loggerhead sea turtles range widely and have been observed along the entire Atlantic coast as far north as Canada (Brazner and McMillan 2008; Ceriani et al. 2014; Shoop and Kenney 1992). Regional abundance on the northwest Atlantic, corrected for unidentified turtles in proportion to the ratio of identified turtles, estimates about 801,000 loggerheads (NEFSC and SEFSC 2011). The three largest nesting subpopulations responsible for most of the production in the western North Atlantic (peninsular Florida, northern United States, and Quintana Roo, Mexico) have all been declining since at least the late 1990s, thus indicating a downward trend for this population (Turtle Expert Working Group 2009). In southern New England, loggerhead sea turtles can be found seasonally, primarily during the summer and fall, but are typically absent during the winter (Kenney and Vigness-Raposa 2010; Shoop and Kenney 1992). Atlantic Marine Assessment Program for Protected Species surveys reported loggerhead sea turtles as the most commonly sighted sea turtles on the shelf waters from New Jersey to Nova Scotia, Canada. During the December 2014 to March 2015 aerial abundance surveys, 280 individuals were recorded (Palka et al. 2017). Large concentrations were regularly observed south and east of Long Island near the RI/MA WEA (NEFSC and SEFSC 2018). Kraus et al. (2016) observed loggerhead sea turtles within the RI/MA WEA in the spring, summer, and fall, with the greatest density of observations in August through September. Kusel et al. (2021) estimated the density of loggerhead sea turtles within the RI/MA WEA to be 0.00755 animals per km^2 at peak occurrence during the fall months, 0.00206 animals per km^2 during the summer months, and 0.00084 animals per km^2 for the rest of the year. The STSSN reported six offshore and 58 inshore loggerhead sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020). In New York State waters, the New York Marine Rescue Center (NYMRC) documented 816 strandings of loggerhead sea turtles from 1980 to 2018 (NYMRC 2021). Winton et al. (2018) estimated densities using data from 271 satellite tags deployed on loggerhead sea turtles between 2004 and 2016 and found that tagged loggerheads primarily occupied the OCS from Long Island, New York, south to Florida, but relative densities in the RI/MA WEA increased during the period between July and September. Collectively, available information indicates that loggerhead sea turtles are expected to occur commonly in the RWF and RWEC as adults, subadults, and juveniles from the late spring through fall, with the highest probability of occurrence from July through September (Winton et al. 2018).

Kemp's ridley sea turtle: Kemp's ridley sea turtles are most commonly found in the Gulf of Mexico and along the U.S. Atlantic coast. The species is primarily associated with habitats on the OCS, with preferred habitats consisting of sheltered areas along the coastline, including estuaries, lagoons, and bays (Burke et al. 1994; NMFS 2019), and nearshore waters less than 120 feet (37 m) deep (Seney and Landry 2008; Shaver et al. 2005; Shaver and Rubio 2008), although they can also be found in deeper offshore waters. Kemp's ridley sea turtle nesting is largely limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. Nesting also occurs in Veracruz, and a few historical records exist for Campeche, Mexico. In the United States, nesting occurs primarily in Texas and occasionally in Florida, Alabama, Georgia, South Carolina, and North Carolina (NMFS and USFWS 2015). Nesting outside of Gulf of Mexico states is rare but has been observed as far north as New York State (NPS 2018). Recent data show that the total number of recorded nests from all beaches in Mexico peaked in 2012 at 22,458 but declined to 12,060 in 2014, the last year for available data (NMFS and USFWS 2015). Juvenile and subadult Kemp's ridley sea turtles are known to travel as far north as Cape Cod Bay during summer foraging (NMFS et al. 2011). Visual sighting data are limited because this small species is difficult to observe using typical aerial survey methods (Kraus et al. 2016). In all, five observations were recorded in the RI/MA WEA during 4 years of aerial surveys, all in August and September 2012 (Kraus et al. 2016). The

species has been sighted near the proposed RWF in other survey efforts, mostly to the south and west of the RI/MA WEA (Right Whale Consortium 2019).

Kusel et al. (2021) conservatively estimate the density of Kemp's ridley sea turtles within the RI/MA WEA to be 0.00006 animals per km^2 throughout the year for exposure modeling purposes. However, this estimate does not accurately reflect seasonality of occurrence. Like all sea turtle species occurring in the region, the Kemp's ridley sea turtle is most commonly observed from late spring through early fall when suitable water temperatures are present, with occurrences later in the year limited to individuals that have been cold stunned and are outside their normal seasonal range. The STSSN reported six offshore and 69 inshore Kemp's ridley sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020), and the NYMRC has documented the stranding of 620 Kemp's ridley sea turtles within New York State waters between 1980 and 2018 (NYMRC 2021). Cold-stunned Kemp's ridley sea turtles are often found stranded on the beaches of Cape Cod (Lui et al. 2019; WBWS 2019). Based on this information, Kemp's ridley sea turtles could occur infrequently as juveniles and subadults from July through September. The highest likelihood of occurrence within the Project limits is along the RWEC corridor in the protected waters of Narragansett Bay. Occurrence in the RWF is possible the likelihood of occurrence is difficult to assess from available data because this species is difficult to detect in visual surveys (Kraus et al. 2016). On this basis, Kemp's ridley sea turtles could occur in the RWF and RWEC in low numbers on an annual basis throughout the life of the Project.

3.19.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential sea turtle impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E2.

Offshore Activities and Facilities

Accidental releases and discharges: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore renewable energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). BOEM also requires applicants to develop spill response and containment plans to quickly address accidental spills of fuels, lubricants, and other contaminants. While marine vessels are an inherent source of accidental releases of trash, debris, and contaminants, these requirements would effectively avoid and minimize these impacts such that the resulting effects to sea turtles would be **negligible** adverse.

Trash or water quality contaminants could be accidentally released as a result of increased human activity associated with future offshore wind construction activities. All species of sea turtles have been documented ingesting plastic fragments (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016) and a variety of other anthropogenic waste (Tomás et al. 2002), likely mistaking debris for potential prey items (Schyuler et al. 2014). Ingesting trash or exposure to aquatic contaminants can be lethal to sea turtles. However, turtles may also be affected sublethally in a variety of ways, which could include experiencing depressed immune system function; poor body condition; and reduced growth rates, fecundity, and reproductive success (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Sea turtles could additionally become entangled in debris, causing lethal or injurious impacts.

Entanglement in lost fishing gear is a significant cause of mortality in both juvenile and adult sea turtles and was noted as a threat to recovery for multiple ESA-listed turtles in the marine environment (NMFS and USFWS 1991, 1992; NMFS et al. 2011). Based on a recent global review, 5.5% of encountered sea turtles were found to be entangled, and 90.6% of these were dead (Duncan et al. 2017). Lost or discarded fishing gear was associated with most of these entanglements, and many experts believed that these impacts could be causing population-level impacts in some areas. Aquatic contaminant exposure could also result in mortality, and sublethal effects could impact many of the species' physiological systems during all life stages (Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Furthermore, accidental releases could indirectly impact sea turtles by impacting prey species. However, all vessels would comply with USCG regulations, and wind farm construction projects would comply with additional BOEM requirements that would avoid and minimize accidental releases of trash or other debris. Therefore, potential accidental releases of trash or debris would not appreciably contribute to adverse impacts to sea turtles and would be **negligible** adverse.

Impacts to sea turtles from accidental spills and releases associated with ongoing future non–offshore wind activities are likely to increase over the next 30 years commensurate with increases in vessel traffic. Future offshore wind activities would contribute to this increased risk. A total of approximately 18 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and OSSs across all projected offshore wind projects along the Atlantic coast. A high-volume spill of toxic materials (fuels, lubricants, and other contaminants) could potentially injure or kill several individual sea turtles and adversely affect habitat suitability. Given that the affected habitats would be at or outside the northern limit of range of most species, the number of individuals impacted would be small relative to population size. In the unlikely event of a high-volume spill, impacts of this magnitude would constitute a moderate effect on sea turtles. BOEM anticipates that the likelihood of a major spill of petroleum products and other toxic substances during construction is very low (a 1 in 1,000 chance per year) due to vessel allisions, collisions, O&M activities, or weather events (Bejarano et al. 2013). WTGs and OSSs are generally self-contained and would not generate discharge. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE Oil spill response plans are required for each project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impacts on affected resources. Given the low probability of a large spill event, impacts to sea turtles from this IPF are likely to be **negligible** adverse.

Climate change: Global climate change is an ongoing potential risk to sea turtles, although the associated impact mechanisms are complex, not fully understood, and difficult to predict with certainty. This is particularly true when considering how the effects of climate change may interact with other IPFs. Possible impacts to sea turtles due to climate change include increased storm severity and frequency; changes in nearshore habitat suitability caused by increased erosion from upland sources; exposure to disease; ocean acidification; and altered habitat, prey availability, ecology, and migration patterns (Hawkes et al. 2009).

However, some of these potential impacts could also contribute to potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. The potential implications of these and other related environmental changes and how they interact with the effects of regional offshore wind development are complex and uncertain. For example, the distribution of leatherback sea turtles in the North Atlantic is shifting northward in response to changes in water

temperature (McMahon and Hays 2006). Should this trend continue it could lead to increased interactions between this species and offshore wind farms on the mid-Atlantic OCS, potentially magnifying the impacts and benefits described above. Over time, climate change, in combination with coastal and offshore development, would alter existing habitats, potentially rendering some areas unsuitable for certain species and more suitable for others. As described in Section 3.19.1, sea turtle populations likely to be impacted by the Project are stable or generally increasing from historic lows. Therefore, potential climate change impacts would be **minor** adverse.

Noise: Under the No Action Alternative, human activities would continue to generate underwater noise with the potential to affect sea turtles. Existing and future sources of anthropogenic underwater noise include commercial, government and military, research, and recreational vessel activity; military sonar; geophysical surveys; and the development and operation of other wind energy projects on the OCS. Several wind energy projects could be developed between 2022 to 2030, and their construction periods could overlap, adding several new sources of underwater noise to baseline levels generated by vessel traffic. As discussed in Section 2.1.3, some projects could be constructed concurrently or could involve concurrent construction activities (e.g., impact pile driving) at two or more locations in proximity, creating the potential for larger and/or overlapping areas of underwater noise effects.

Existing and potential future anthropogenic noise sources generally fall into two categories: 1) impulsive noise, defined as the instantaneous change in sound pressure over a short period of time; and 2) non-impulsive noise, which could be intermittent or remain constant and stable over a given time period. Impulsive and non-impulsive noise sources associated with offshore wind projects are discussed in the sections below.

Impulsive noise: Existing and potential future sources of impulsive underwater noise in the GAA include impact pile driving used in nearshore and offshore construction activities and geological and geophysical surveys.

Sea turtles could experience any of the following three potential exposure scenarios under the No Action Alternative:

1. Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
2. Non-concurrent exposure to noise from multiple pile-driving events within the same year
3. Exposure to two or more concurrent or non-concurrent pile-driving events over multiple years

The reader is referred to Section 3.15 for a discussion of these concurrent noise exposure scenarios.

Geological and geophysical surveys generate high-intensity impulsive sound with the potential to result in short-term and long-term impacts on sea turtles if they are present in the ensonified area. Offshore wind surveys typically involve HRG equipment, which can generate non-impulsive noise that is generally less intense than noise generated from other geological and geophysical survey methods. Potential impacts from HRG equipment include sub-bottom profilers (e.g., boomer and sparker categories of equipment) that could be audible to sea turtles.

None of the equipment being operated for these surveys that overlaps with the hearing range (30 Hz to 2 kHz) for sea turtles has source levels loud enough to result in PTS or TTS based on the peak or cumulative exposure criteria. Therefore, physical effects are extremely unlikely to occur. Sea turtles could

exhibit a behavioral response when exposed to received levels of 175 dB re 1 µPa (rms), and some HRG is within their hearing range (below 2 kHz). For boomers and bubble guns, the distance to this threshold is 40 m, and is 90 m for sparkers. Thus, a sea turtle would need to be within 90 m of the source to be exposed to potentially disturbing levels of noise. We expect that sea turtles would react to this exposure by swimming away from the sound source; this would limit exposure to a short time period—just the few seconds it would take an individual to swim away to avoid the noise. The risk of exposure to potentially disturbing levels of noise is reduced by the use of PSOs to monitor for sea turtles. At the start of a survey, equipment cannot be turned on until the clearance zone is clear for at least 30 minutes. This condition is expected to reduce the potential for sea turtles nearby to be exposed to noise that could be disturbing. However, even in the event that a sea turtle is submerged and not seen by the PSO, in the worst case, it is expected that sea turtles would avoid the area ensonified by the survey equipment that they can perceive. Because the area where increased underwater noise would be experienced is transient and increased underwater noise would only be experienced in a particular area for only seconds, BOEM expects any effects to behavior to be minor and limited to a temporary disruption of normal behaviors, temporary avoidance of the ensonified area, and minor additional energy expenditure spent while swimming away from the noisy area. If foraging or migrations are disrupted, BOEM expects that they would quickly resume once the survey vessel has left the area. No sea turtles would be displaced from a particular area for more than a few minutes. While the movements of individual sea turtles would be affected by the sound associated with the survey, these effects would be temporary (seconds to minutes) and localized (avoiding an area no larger than 90 m), and there would be only a minor and temporary impact on foraging, migrating, or resting sea turtles as the vessel continues along a survey line. Effects to individual sea turtles from brief exposure to potentially disturbing levels of noise are expected to be minor and limited to a brief startle, a short increase in swimming speed, and/or short displacement and would be so small that they cannot be meaningfully measured, detected, or evaluated; therefore, effects are negligible.

BOEM has concluded that disturbance of sea turtles from underwater noise generated by site characterization and site assessment activities would likely result in temporary displacement and other behavioral or nonbiologically significant physiological consequences (i.e., no injury or mortality would occur), and impacts on sea turtles would be negligible adverse.

Impulsive underwater noise from impact pile driving during planned offshore wind development, due to the anticipated frequency and spatial extent of effects, represents the highest likelihood for exposure of individual sea turtles to adverse impacts from noise. Although these potential impacts are acknowledged, their potential extent and magnitude is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study. Potential behavioral impacts could include altered submergence patterns, temporary disturbance, startle response (diving or swimming away), and temporary displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or a life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer any long-term consequences (O'Hara and Wilcox 1990; Hazel et al. 2007). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. In theory, reduced hearing sensitivity could limit the ability to detect predators and prey or

find potential mates, reducing the survival and fitness of affected individuals. However, the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014). Impacts to sea turtles from construction-related noise would likely be limited to minor or moderate short-term impacts on a small number of individuals. These short-term impacts on individuals are not expected to result in population-level effects; the effects of impulsive noise on sea turtles would therefore be **minor** adverse overall.

Non-impulsive noise: Non-impulsive underwater noise sources in the GAA include baseline noise levels from activities not regulated by BOEM, such as commercial, military and government, research, and recreational vessel traffic; aircraft; and offshore development activities. The planned development of other wind energy facilities would contribute additional new sources of intermittent non-impulsive underwater noise, including helicopters and fixed-wing aircraft, construction and O&M vessels, and vibratory pile driving during construction. Operational noise from WTGs would constitute a low-level, non-impulsive underwater noise source throughout the life of a given project.

Helicopters and fixed-wing aircraft could be used during initial site surveys, protected species monitoring prior to and during construction, and facility monitoring. Sea turtle responses to aircraft noise and disturbance is not well documented. Bevan et al. (2018) observed no evident behavioral responses from sea turtles exposed to drones flown directly overhead at altitudes ranging from 60 to 100 feet. Helicopters and aircraft would operate at altitudes of 1,000 feet or more except when helicopters are landing or departing from service vessels. In development of American National Standards Institute (ANSI) guidelines for fishes and sea turtles, Popper et al. (2014) did not consider aircraft noise because it was not considered to pose a great risk. Based on this information, cumulative effects on sea turtles from aircraft used for wind energy development on the OCS would be expected to be negligible.

Vibratory pile driving used during submarine cable construction is the most intensive source of intermittent, non-impulsive underwater noise expected to result from planned offshore wind energy development. Vibratory pile-driving noise can exceed levels associated with behavioral disturbance in sea turtles but only within a short distance (i.e., less than 200 feet) from the source. Given this low exposure probability to vibratory pile-driving noise and the fact that vibratory pile-driving activities would be limited in extent, temporary in duration, and widely separated, vibratory pile-driving noise effects on sea turtles would be negligible adverse.

Construction and operational vessels are the most broadly distributed source of intermittent non-impulsive noise associated with offshore wind projects. Sea turtle exposure to underwater vessel noise would correspondingly increase as a result of planned offshore wind projects, especially during construction periods. Applying vessel activity estimates developed by BOEM based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019b), vessel activity could peak in 2025, with as many as 276 vessels involved in the construction of reasonably foreseeable projects (see Section 2.1.3 for details). However, this increase must be considered relative to the baseline level of vessel traffic. The relatively low frequency range of turtle hearing (100–1,200 Hz) (Ketten and Bartol 2006; Lavender et al. 2014) overlaps the broad frequency spectrum of intermittent non-impulsive noise produced by vessels (10–1,000 Hz). Sea turtles could respond to vessel approach and/or noise with a startle response and a temporary stress response (NSF and USGS 2011). Overall, impacts to sea turtles from vessel noise would be negligible. Although sea turtles could become

habituated to repeated noise exposure over time (Hazel et al. 2007), vessel noise effects for other wind farm development projects are expected to be broadly similar to noise levels from existing vessel traffic in the region. Nonetheless, periodic localized, intermittent, and temporary behavioral impacts on sea turtles could occur. Underwater noise generated by construction vessels would not exceed injury thresholds for turtles, as noise levels produced by vessels in general are below levels that could cause potential auditory threshold shifts. Behavioral responses to vessels have been reported but are thought to be more associated with visual cues, as opposed to auditory cues (Hazel et al. 2007), although both senses likely play a role in avoidance. A conservative assumption is that construction and support vessels could elicit behavioral changes in individual sea turtles near the vessels. It is assumed that these behavioral changes would be limited to evasive maneuvers such as diving, changes in swimming direction, or changes in swimming speed to distance themselves from vessels. Based on sea turtle responses to other types of disturbance (e.g., Bevan et al. 2018), turtle behavior is expected to return to normal when vessel noise dissipates. Given limited turtle sensitivity to underwater noise produced by vessels, the short-term nature of any behavioral responses, and the patchy distribution of sea turtles in the GAA, the effects of vessel noise from future activities on sea turtles would be negligible adverse.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 dB re 1 µPa SPL rms) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. Sea turtle hearing is largely within the frequency range (< 1,200 Hz) for operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold (175 dB_{RMS} re 1 µPa). This indicates that operational noise effects from other future actions would likely be negligible adverse.

Overall, effects of non-impulsive noise on sea turtles would be **negligible** adverse because of the patchy distribution of sea turtles and limited likelihood of behavioral responses to expected noise levels.

Presence of structures: The addition of up to 3,008 new offshore foundations in the GAA could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014). The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). Section 3.13 discusses reef creation and altered water flow in detail. The significance of these ecological changes to sea turtles is unknown, but the biological productivity generated by reef effects could result in improved foraging opportunities for some species at project scales. For example, loggerhead turtles may benefit from the increased abundance of crustaceans and other prey species concentrated around offshore structures. On this basis, the presence of structures could produce permanent **minor** beneficial effects on sea turtles that would persist over the life of the Project.

In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance (van Berkel et al. 2020). There is considerable uncertainty as to how these broader ecological changes would affect sea turtles in the future and how those changes will interact with other human-caused impacts. The

effect of reef effects and hydrodynamic impacts on sea turtles and their habitats under the No Action Alternative could be adverse or beneficial, varying by species, and their extent and magnitude is unknown.

The presence of structures could also concentrate recreational and commercial fishing around foundations, which could indirectly increase the potential for sea turtle entanglement in both lines and nets (Gall and Thompson 2015; Nelms et al. 2016; Shigenaka et al. 2010). Entanglement in both lines and nets could lead to injury and mortality due to abrasions, loss of limbs, and increased drag, leading to reduced foraging efficiency and ability to avoid predators (Barreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). Between 2016 and 2018, 186 sea turtles were documented as hooked or entangled with recreational fishing gear (BOEM 2021a). Due to the high number of foundations in a given lease area, it is likely that recreational and for-hire fisheries would avoid overcrowding structures by dispersing effort across many WTG foundations. However, the risk of entanglement and hooking or ingestion of marine debris could slightly increase from recreational and for-hire fishing since both fishers and turtles may be attracted to the same areas.

If structures result in vessel displacement or gear shifts, the potential impact to sea turtles is uncertain. Increased risk would not be expected by vessel displacement due to the patchy distribution of sea turtles. However, it could result in a potential increase in the number of vertical lines in the water column if there is no commensurate reduction in fixed-gear types as compared to mobile gear. In such circumstances of a greater shift from mobile gear to fixed gear, there would be a potential increase in the number of vertical lines, resulting in an increased risk of sea turtle interactions with fishing gear. Therefore, associated effects of structures on sea turtles through potential reef effects, hydrodynamic impacts, and concentration of fishing would be **minor** adverse.

Vessel traffic: Vessel strike is an increasing concern for sea turtles. The percentage of loggerhead sea turtles stranded with injuries consistent with vessel strikes increased from approximately 10% in the 1980s to 20.5% in 2004, although an unknown number may have been struck postmortem (NMFS and USFWS 2007). Sea turtles are expected to be most susceptible to vessel collision in shelf waters, where they forage. Furthermore, they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007); typical vessel speeds in the GAA could exceed 10 knots. Up to 276 vessels associated with offshore wind development could be operating in the GAA during the peak construction period in 2025. Additional fishing vessels could also be present in the vicinity due to the expected increase in fish biomass around the WTG structures. Increased vessel traffic could result in sea turtle injury or mortality; however, the proportional increase in vessel traffic from baseline would be minimal (refer to Section 3.16 and COP Appendix R [DNV GL Energy USA, Inc. 2020]). Despite the unlikely potential for individual fatalities, no population-level impacts on sea turtles are expected based on occurrence and potential exposure. Assuming other offshore wind projects employ the same minimization measures included in this Project (see Table F-1 in Appendix F), impacts would be further reduced and would be considered **negligible** to **minor** adverse.

Onshore Activities and Facilities

The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components

of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.

3.19.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts associated with the Project to sea turtles would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on sea turtles, primarily through, but not limited to, construction-related lighting, noise, habitat alternation, collision risk, and the artificial reef effect.

Based on the current science, BOEM anticipates that the impacts of ongoing activities, especially vessel traffic, commercial and recreational fisheries gear interaction, and climate change, would be minor. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind development include increased vessel traffic; new submarine cables and pipelines; channel-deepening activities; and the installation of new towers, buoys, and piers. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be minor. BOEM expects that the combination of ongoing activities and reasonably foreseeable activities other than offshore wind development to result in minor impacts on sea turtles, driven primarily by increasing vessel traffic and interactions with commercial and recreational fisheries gear.

The combined impact-level criteria in Table 3.3-2 and Table 3.3-3 in Chapter 3 are used to characterize the combined effects of all IPFs likely to occur in the GAA under the No Action Alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts from construction and operational noise and exposure to vessel traffic and **minor** beneficial impacts to sea turtles from increased biological productivity created by reef effects. Those impacts would range from short term to long term in duration. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures——namely foundations, scour/cable protection, and pile-driving noise.

The No Action Alternative would forgo any monitoring that Revolution Wind has committed to perform, the result of which could provide an understanding of the effects of offshore wind development, benefit future management of sea turtles, and inform planning of other offshore developments. However, other ongoing and future surveys could provide similar data.

3.19.2 Environmental Consequences

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

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

The following design parameters would result in reduced impacts relative to those generated by the design elements considered under the PDE:

- The permitting and installation of fewer WTGs, resulting in fewer offshore structures and reduced IAC cable length. This would reduce the extent of temporary to long-term impacts on marine mammals by
    - reducing the extent and duration of underwater noise impacts from WTG foundation installation; and
    - reducing the extent of reef and hydrodynamic effects resulting from structure presence.
- The Project could use a casing pipe method to construct the RWEC sea-to-shore transition, which would result in less acoustic impact than vibratory pile driving to construct a cofferdam (Zeddies 2021).
- The use of a temporary cofferdam for RWEC sea-to-shore transition construction would reduce suspended sediment effects on sea turtles.

See Appendix E2 for a summary of IPFs analyzed for sea turtles across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Appendix E, Table E2-6.

Table 3.19-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion. This comparison considers the implementation of all EPMs proposed by Revolution Wind to avoid and minimize adverse impacts on sea turtles. These EPMs are summarized in Appendix F, Table F-1.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes rationale for the overall effect determination. Overall impacts associated with the each alternative would result in **minor** adverse impacts on sea turtles in the GAA because unavoidable adverse impacts on individual sea turtles could occur, but those impacts are unlikely to measurably affect the viability of any sea turtle species at the population level.

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Table 3.19-2. Alternative Comparison Summary for Sea Turtles

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Offshore**: While marine vessels are an inherent source of accidental releases of trash, debris, and contaminants, existing regulatory requirements would effectively avoid and minimize these impacts such that the resulting effects to sea turtles would be **negligible** adverse. All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the BSEE Oil spill response plans are required for each project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impacts on affected resources. Given the low probability of a large spill event, impacts to sea turtles are likely to be **negligible** adverse.	**Offshore**: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore renewable energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (Jacobs 2020). Given these restrictions, the short-term impacts to sea turtles from trash and debris from the Project would be **negligible** adverse. Project EPMs, permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. Given the low potential for spills and minimal risk of exposure to small temporary spills, the risk from construction-related spills is **negligible** to **minor** adverse. Impacts on sea turtles from accidental spills or releases of pollutants are considered **minor** adverse during O&M because of the low probability of the risk and EPMs. Cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse because of the regulatory protections and limited likelihood of sea turtle exposure.	**Offshore:** Effects on sea turtles from accidental releases and discharges under Alternatives C through F would be similar to those described for the Proposed Action. Alternatives C through F would include the same EPMs to avoid and minimize impacts to sea turtles from accidental releases and discharges. Effects on sea turtles would therefore be **negligible** adverse and short term. While unlikely, vessels collision or allisions could occur during Project construction, presenting the potential risk of larger spills, potentially harmful to sea turtles. Alternatives C through F would slightly reduce total chemical and lubricant uses relative to the Proposed Action, but this effect would be small in comparison to projected chemical use on the mid-Atlantic OCS. When combined with other offshore wind projects, up to approximately 19 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTG foundations and OSSs. However, all future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. Cumulative impacts associated with the Habitat Alternative when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse.			
	Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, impacts of onshore activities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.			
Climate change	**Offshore**: Over time, climate change, in combination with coastal and offshore development, would alter existing habitats, potentially rendering some areas unsuitable for certain species and more suitable for others. However, sea turtle populations likely to be impacted by the Project are stable or generally increasing from historic lows. Therefore, potential climate change impacts would be **minor** adverse.	**Offshore**: Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Therefore, the Proposed Action when combined with other past, present, and reasonably foreseeable actions is expected to result in **minor** adverse cumulative impacts to sea turtles due to the anticipated shifts in distributions.	**Offshore:** The types of impacts from global climate change described for the No Action Alternative would occur under Alternatives C through F, but as with the Proposed Action, this alternative could also contribute to a long-term net decrease in GHG emissions.However, northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. This magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Therefore, Alternatives C through F when combined with other past, present, and reasonably foreseeable actions and ongoing environmental trends is expected to result in **minor** adverse cumulative impacts to sea turtles.			
	Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, impacts of onshore activities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
	and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.					
Noise	**Offshore**: Under the No Action Alternative, human activities would continue to generate underwater noise with the potential to affect sea turtles. These short-term impacts on individuals are not expected to result in population-level effects; the effects of impulsive noise on sea turtles would therefore be **minor** adverse, while effects of non-impulsive noise on sea turtles would be **negligible** adverse because of the patchy distribution of sea turtles and limited likelihood of behavioral responses to expected noise levels.	**Offshore**: A temporary increase in underwater noise could impact sea turtles if they are present in the area during the time of RWF and offshore RWEC construction. Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. Sea turtles could also respond to vessel approach and/or noise with a startle response and a temporary stress response. Based on the combination of minimization measures and the low numbers of sea turtles expected in the RWF and RWEC, however, impacts to sea turtles from impact pile driving are expected to be **negligible** to **minor** adverse and impacts to sea turtles from vessel noise would be **negligible** adverse. Likewise, underwater noise impacts from HRG surveys are expected to be **minor** adverse and aircraft noise impacts sea turtles are expected to be **negligible** adverse because exposures would be limited in extent and temporary in duration. Project decommissioning would require the use of construction vessels of similar number and class as those used during construction, and would therefore range from **negligible** to **minor** adverse. Sea turtle hearing is largely within the frequency range (< 1,200 Hz) of operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold, resulting in **negligible** adverse effects. Based on the above findings, noise-related impacts of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to sea turtles, depending upon the noise source.	**Offshore:** See Section 3.19.2.3.1 for construction analysis. Alternatives C through F would include the same, or similar, operational and decommissioning noise-producing activities as those described for the Proposed Action but would be reduced based on the reduction in the number of WTGs and other operational elements. Thus, the impacts of operational and cumulative noise are also considered **negligible** to **minor** adverse.			
	Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, impacts of onshore activities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	**Offshore**: The addition of up to 3,008 new offshore foundations in the GAA could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014). In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance and concentrate recreational and commercial fishing around foundations, which could indirectly increase the potential for sea turtle entanglement in both lines and nets. Therefore, associated effects of structures on sea turtles through potential reef effects, hydrodynamic impacts, and concentration of fishing would be **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.	**Offshore**: Construction and installation of offshore structures would have temporary **negligible** to **minor** adverse effects on sea turtles, varying in significance by species, due to underwater noise impacts related to impact pile driving and noise and disturbance from associated vessel activity. Potential long-term, intermittent impacts could persist until decommissioning is complete and structures are removed. These O&M impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects. BOEM estimates a cumulative total of 3,110 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. For similar reasons as described above, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts and potential **minor** beneficial cumulative impacts to sea turtles.	**Offshore**: Alternatives C through F would result in impacts to sea turtles associated with the presence of WTG and OSS foundations that are similar to those described for the Proposed Action, but those effects would be reduced in extent. This would reduce the extent of long-term impacts on benthic habitat, water flow, prey aggregation, and fishing activity. This would also reduce the extent of antcipated hydrodynamic and reef effects. But given the offsetting nature of anticipated effects, the differences between alternatives on sea turltes would be uncertain. As with the Proposed Action, the overall impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Indirect effects on the prey base of some sea turtle species (i.e., invertebrates) from the presence of structures would occur. Potential long-term, intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.			
	Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, impacts of onshore activities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Vessel traffic	**Offshore**: Increased vessel traffic could result in sea turtle injury or mortality; however, the proportional increase in vessel traffic from baseline would be minimal. Despite the unlikely potential for individual fatalities, no population-level impacts on sea turtles are expected based on occurrence and potential exposure. Assuming other offshore wind projects employ similar minimization measures included in this Project (see Table F-1 in Appendix F), impacts would be further reduced and would be considered **negligible** to **minor** adverse.	**Offshore**: Vessel collisions with individual turtles could occur, resulting in mortalities. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes during Project construction would be low and would have negligible effects at the population level. Therefore, the potential effects of construction and decomissioning vessel collisions on sea turtles would be **minor** adverse. O&M vessel use would represent a minimal increase in regional vessel traffic over the life of a facility and the effects to sea turtles are expected to be **negligible** to **minor** adverse. An increase in vessel traffic poses an increased likelihood of collision-related injury and mortality relative to existing baseline conditions. Some sea turtles could be injured or killed as a result, but the number of individuals impacted is not likely to significantly increase the existing mortality rate from vessel strikes. Additionally, BOEM expects that similar EPMs will be included in future offshore wind projects, helping to minimize the vessel strike risk. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse; BOEM does not expect the viability of sea turtle populations to be affected.	**Offshore:** Alternative C to F would require the same types and number of construction O&M and decommissioning vessels producing the similar impacts to those described for the Proposed Action, but the number of vessel trips and overall duration of construction activity would be reduced. The risk of collisions, disturbance, and other associated effects on sea turtles would similarly be reduced consistent with the overall reduction in vessel trips required to construct each alternative configuration. Thus, vessel traffic associated with the RWF would be expected to increase less than the 2.1% per year across transects 13–17 (see Figure 3.15-2) estimated for the Proposed Action. For the Proposed Action, Revolution Wind (Tech Environmental 2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. It can be assumed that the Transit Alternative would require similar or slightly fewer vessel trips during O&M. Sea turtles are likely to be most susceptible to vessel collision in coastal foraging areas crossed by construction vessels traveling between the RWF and offshore RWEC and area ports. Hazel et al. (2007) indicated that sea turtles may not be able to avoid being struck by vessels at speeds exceeding 2 knots, and collision risk increases with increasing vessel speed. Habituation to noise may also increase the risk of vessel collision. However, avoidance behaviors observed suggest that a turtle's ability to detect an approaching vessel is more dependent on vision than sound, although both may play a role in eliciting behavioral responses. Project EPMs include the implementation of NOAA vessel guidelines (see Appendix F) for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions. Nevertheless, collisions with individual turtles could occur, resulting in mortalities. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes during Project construction would be low and would have negligible effects at the population level. O&M vessel use would represent a minimal increase in regional vessel traffic over the life of the Project and, as detailed in the EPMs listed in Table F-1 in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with sea turtles, making the risk of vessel strikes from Project monitoring vessels unlikely. Therefore, the potential effects of vessel collisions on sea turtles would **negligible** to **minor** adverse for the life of the Project; BOEM does not expect the viability of sea turtle populations to be affected.			
	Onshore: The construction and installation, O&M, and eventual decommissioning of onshore project facilities and related activities associated with planned and potential future offshore wind energy projects would not be expected to result in measurable impacts on the marine environment. Therefore, the onshore components of planned and future projects are likely to have no measurable effects on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.	**Onshore:** Onshore Project activities would not result in impacts to marine resources regardless of alternative. Therefore, impacts of onshore activities to sea turtles would be the same as those for the No Action Alternative: **negligible** adverse.			

3.19.2.2 Alternative B: Impacts of the Proposed Action on Sea Turtles

3.19.2.2.1 Construction and Installation

Offshore Activities and Facilities

Construction impacts to sea turtles could occur from accidental releases and discharges, artificial lighting, seafloor disturbance, entrainment and impingement, underwater and airborne noise, vessel traffic (strikes and noise), and water quality degradation. The potential for these impacts to occur are discussed in detail by IPF.

Accidental releases and discharges: During construction of the RWF and RWEC, there could be a short-term risk of sanitary and other waste fluids or fuels and other petrochemicals accidentally entering the water. If sea turtles were to be exposed to an oil spill or a discharge of waste material, studies indicate that respiration, skin, some aspects of blood chemistry and composition, and salt gland function could be significantly impacted in exposed individuals (Vargo et al. 1986). Any nonroutine spills or accidental releases that could result in negligible and short-term impacts to surface water resources would be avoided or minimized through the implementation of the Project SPCC plan and other EPMs (see Table F-1 in Appendix F). Impacts on sea turtles from accidental spills or releases of pollutants are considered negligible because of the low probability of the risk and EPM implementation.

Trash and debris that enter the water represent a risk factor to sea turtles because the turtles could ingest or become entangled in debris, causing lethal or injurious impacts. Pollution (e.g., plastic) is often mistaken for food such as jellyfish and ingested, which can block intestinal tracts, causing injury or mortality. See Section 3.15.2 for additional debris and entanglement analysis. Personnel working offshore would receive training on sea turtle and marine debris awareness. Impacts on sea turtles from accidental deposits of trash or debris associated with RWF are considered minor because implementation of proposed EPMs would lower the probability of such risk.

BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 585.105(a)). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (Jacobs 2020). Given these restrictions, the short-term impacts to sea turtles from trash and debris from the Project would be **negligible** adverse.

Construction vessels also pose a potential risk for Project-related accidental spills. As described in Section 3.21.2.2.1, the chance of a spill occurring due to vessel allisions or collisions would be low (once per 1,000 years). In the unlikely event an allision or collision involving Project vessels or components resulted in a high-volume spill, impacts on water quality would be minor to moderate adverse and temporary to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill. Project EPMs, permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. Given the

low potential for spills and minimal risk of exposure to small temporary spills, the risk from construction-related spills is **negligible** to **minor** adverse.

Noise: A temporary increase in underwater noise is the most likely construction-related factor that could impact sea turtles if they are present in the area during the time of RWF and offshore RWEC construction. Construction noise sources include impact and vibratory pile driving, UXO detonation, HRG surveys, construction vessels, and helicopters and fixed-wing aircraft.

The current literature and effect analysis guidance regarding sensitivity to underwater noise effects vary depending on the source. Popper et al. (2014) reviewed available data and suggested the threshold levels of 207 peak decibels (dB re 1 µPa) and 210 decibels referenced to the sum of cumulative pressure in micropascals squared, normalized to 1 second (dB re 1 μPa^2s) for injurious (i.e., hearing loss) underwater noise for sea turtles. These recommended criteria are for mortality and potential mortal injury. NMFS has considered injury onset for PTS (i.e., permanent hearing injury) beginning at 232 dB re 1 µPa and 204 dB re 1 μPa^2s and TTS (i.e., a temporary and recoverable loss of hearing sensitivity) beginning at 226 peak dB re 1 µPa and 189 cumulative dB re 1 μPa^2s (Navy 2017). Exposure modeling for the extent of injurious effects from impulsive underwater noise was completed by Kusel et al. (2021) using the Navy (2017) thresholds, including a behavioral response SPL threshold of 175 rms dB re 1 µPa. These thresholds apply to juvenile, subadult, and adult life stages.

Table 3.19-3 summarizes thresholds for underwater noise effects and the maximum distances to injurious and behavioral effects from construction-related underwater noise levels from construction-related activities, including impact pile driving (Kusel et al. 2021), UXO detonation (Hannay and Zykov 2021), and HRG surveys (BOEM 2021b). These effects are described in greater detail below.

Table 3.19-3. Distances to Sea Turtle Underwater Noise Injury and Behavioral Thresholds for Wind Turbine Generator and Offshore Substation Foundation Installation

Activity†	Number of Sites	Total Days	Noise Exposure Type	Exposure Threshold*	Range of Threshold Distances (feet)‡
12-m WTG monopile foundation installation	100	33	Peak injury	232	–
			Cumulative Injury	204	98–689
			Behavioral or TTS	175	1,903–2,920
15-m OSS monopile foundation installation	2	2	Peak injury	232	–
			Cumulative Injury	204	0–820
			Behavioral or TTS	175	2,362–3,182
Temporary cofferdam installation	1	14	Cumulative injury	210	102
			Behavioral or TTS	189	174

Activity†	Number of Sites	Total Days	Noise Exposure Type	Exposure Threshold*	Range of Threshold Distances (feet)‡
UXO detonation	13	13	Injury	204	207–1,699
			TTS	189	354–8,235
HRG surveys	10,755	248	Behavioral	189	0–300
Construction vessel operation	N/A	~730	Behavioral or TTS	189	–

* Peak injury thresholds are SPL in dB re 1 µPa; cumulative injury thresholds are frequency-weighted SEL in dB re 1 $\mu Pa^2 \cdot s$ based on 24 hours of continuous exposure. The peak injury threshold is not recommended for estimating risk of injury from UXO detonation (Hannay and Zykov 2021).

† Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. Installation scenario for 15-m monopile is 11,500 strikes/pile at installation rate of one pile/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction. Sound source scenario for UXOs assumes detonation of thirteen 1,000-pound explosives with 10 dB of sound source attenuation.

‡ Pile-driving values are maximum threshold distances modeled by Kusel et al. (2021) for winter conditions. UXO detonation values are the range of maximum distances modeled by Hannay and Zykov (2021) for 5- to 1,000-pound explosive devices. Both sets of values assume 10 dB of sound attenuation.

As shown in Table 3.19-3, impact pile driving and UXO detonation produce sufficient underwater noise to cause permanent hearing injury and behavioral effects on sea turtles. The combined impact area for pile driving is sufficiently large that the potential for hearing injury to some sea turtles cannot be discounted. Orsted anticipates that up to 13 UXOs ranging from 5 to 1,000 pounds in size may need to be detonated in place (LGL 2022). The number, size, and distribution of UXOs potentially occurring in the Maximum Work Area is not currently known, but the largest devices are most likely to be found within the central portion of the RWF and on the RWEC corridor in state waters at the mouth of and outside of Narragansett Bay (Ordtek 2021). The extent and duration of exposure to potential injury-level effects from UXO detonation is relatively small in comparison to pile driving. This suggests that even under the maximum impact scenario considered in this analysis, the risk of permanent hearing injury to sea turtles is relatively low.

Little is known about the role of sound perception in the sea turtle's typical activities. Although sea turtles have relatively unspecialized ears relative to other vertebrate species, their auditory organs appear to be specifically adapted to underwater hearing (Dow Piniak et al. 2012). Studies indicate that hearing in sea turtles is confined to lower frequencies, below 1,200 Hz, with the range of highest sensitivity between 100 and 700 Hz (Dow Piniak et al. 2012), with some variation between species (Bartol and Ketten 2006; Dow Piniak et al. 2012; Martin et al. 2012; Piniak et al. 2016). In captive enclosures and during NSF-funded at-sea seismic monitoring programs, sea turtles generally respond to seismic survey sound with behavioral changes such as startling, increasing swimming speed, and swimming away from and/or locally avoiding the source (McCauley et al. 2000; NSF and USGS 2011). The majority of pile-driving activities are expected to take place during daylight hours. However, pile driving could occur at any time night under specific circumstances.[3] Sea turtles migrating through the area when pile driving occurs are

[3] Installation of each foundation pile would begin during daylight hours with the intent of completion before dark. However, in certain circumstances the installation process may be delayed or take longer than anticipated. This may require continuing impact pile driving after dark if the installation must be completed for safety purposes and/or to ensure structural stability.

expected to adjust their course to avoid the area where noise is elevated above 175 dB re 1 µPa. Depending on how close the individual is to the pile being driven, this could involve swimming a mile or more to avoid stressful noise levels. Such behavioral alterations could cause turtles to cease foraging or expend additional effort and energy avoiding the area. Presumably, turtles could continue foraging activities outside the area of elevated noise levels as adjacent habitat provides similar foraging opportunities. The sea turtle may experience physiological stress during this avoidance behavior, but this stressed state would be anticipated to dissipate over time once the turtle is outside the ensonified area. Either a temporary or permanent reduction in hearing sensitivity could be harmful for sea turtles, but the potential extent and magnitude is unclear because the role that hearing plays in sea turtle survival (e.g., for predator avoidance, prey capture, and navigation) is poorly understood (NSF and USGS 2011). The use of PSOs, exclusion and monitoring zones, and pile-driving soft start measures (see Table F-1 in Appendix F) would minimize the risk of sea turtle exposure to elevated underwater noise levels. The efficacy of exclusion and monitoring zones would be less during periods of nighttime pile driving, potentially exposing more individuals to elevated underwater noise.

Foraging disruptions due to displacement would be temporary and are not expected to last longer than a few hours per day when pile driving occurs. This displacement would result in a relatively small energetic consequence that would not be expected to have long-term impacts on sea turtles. Construction activities could temporarily displace animals into areas that have a lower foraging quality or result in higher risk of interactions with ships or fishing gear. However, the duration of disturbance is limited to active pile driving (i.e., approximately 220 and 380 minutes per WTG and OSS monopile, respectively), and individuals could become habituated to repeated exposures over time and ignore a stimulus that was not accompanied by an overt threat (Hazel et al. 2007).

Impact pile driving during construction is the loudest potential impulsive underwater noise source associated with the Project and would produce the most extensive effects. As discussed in Section 3.19.1.1, the potential significance of impulsive underwater noise is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study. Potential behavioral impacts could include altered submergence patterns, temporary disturbance, startle response (diving or swimming away), and temporary displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer long-term consequences (O'Hara and Wilcox 1990). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Kusel et al. (2021) developed estimates of the number of sea turtles that could be exposed to potential adverse noise-related effects from WTG and OSS foundation installation. They used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to PTS, TTS, and other temporary physiological and behavioral effects from construction noise exposure. The analysis used a conservative construction schedule in which the WTG and OSS installation was concentrated during the highest density months for each species, with up to three piles per day for 30 days. Based on the established timing restrictions to protect marine mammal species (i.e., NARWs), construction would occur primarily during the summer months when sea turtles (especially loggerheads and leatherbacks) have a higher likelihood of being present. The density estimates supporting the analysis are therefore

likely representative of densities when construction activities would occur. The exposure estimates presented in Table 3.19-4 assume a broadband attenuation of 10 dB and a Project construction duration of approximately 35 days, assuming an aggressive installation schedule of three WTG and one OSS foundations per day.

Hannay and Zykov (2022) used a similar model to estimate the threshold distances for PTS and TTS exposure from UXO detonation. Turtles within 689 feet of UXO detonation could experience injury based on the threshold of 210 dB re 1 μPa^2s. Turtles within 1,699 feet exposed to multiple UXO detonations in a single day could experience accumulated injury from based on the 204 dB SEL dB re 1 μPa^2s. Turtles within 8,235 feet of UXO detonation could experience behavioral impacts based on the threshold of 189 dB re 1 μPa^2s. The UXO detonation plan would include the same or similar sound attenuation, PSOs, and site clearance EPMs used for pile driving (see Table F-1, Appendix F) to avoid and minimize adverse impacts to sea turtles. These exposure estimates do not consider the benefits to sea turtles from avoiding accidental uncontrolled UXO detonations that could occur in the absence of the Project. Zykov (2022) developed an exposure model to estimate the number of individuals by species that could be exposed to PTS and TTS from UXO detonation. The exposure scenario for UXOs assumes that thirteen 1,000-pound devices would require detonation within the RWF and RWEC work areas and that the devices are distributed such that the exposure areas would not overlap. Zykov (2022) determined that less than one individual leatherback and less than one individual loggerhead sea turtle could be exposed to PTS or TTS effects from UXO detonation in the RWEC corridor, and none would be exposed to these effects from detonations in the RWF. No Kemp's Ridley or green sea turtles are likely to be exposed to PTS or TTS effects in either area.

Table 3.19-4. Estimated Number of Sea Turtles Experiencing a Permanent Threshold Shift and Temporary Threshold Shift or Behavioral Effects from Construction-Related Impact Pile Driving

Species	Source	PTS Cumulative Sound Exposure (number of indivuals)	PTS from Peak Sound Pressure Exposure (number of indivuals)		TTS or Behavioral Effects (number of indivuals)	Effect Significance*
Kemp's ridley turtle	Impact pile driving	< 0.01	0		< 1	Negligible
	UXO detonation	--	0	0		
Leatherback turtle	Impact pile driving	< 1	0		8	Minor
	UXO detonation	--	< 1	< 1		
Loggerhead turtle	Impact pile driving	< 1	0		4	Minor
	UXO detonation	--	< 1	< 1		
Green turtle[†]	Impact pile driving	< 0.01	0		< 1	Negligible
	UXO detonation	--	0	0		

Source: Kusel et al. (2021), Zykov (2022)

Note: Modeled exposure estimates based on impact hammer installation of one hundred 12-m and two 15-m monopiles. Installation scenario assumes use of a noise attenuation system achieving 10-dB effectiveness. Values < 1 indicate a modeled exposure estimate of greater than 0 but less than 0.5 affected individual, which is considered a result of zero for regulatory purposes.

* See impact significance criteria definitions in Chapter 3, Table 3.3-2.

[†] Kraus et al. (2016) did not observe any green sea turtles in the RI/MA WEA. Densities of Kemp's ridley sea turtles are used as a conservative estimate.

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. However, the potential effects on sea turtles are reduced through the implementation of EPMs and additional minimization measures (see Appendix F), including PSOs, soft starts, and noise attenuation systems. Reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals, but the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014). Based on the combination of minimization measures and the low numbers of sea turtles expected in the RWF and RWEC, impacts to sea turtles from impact pile driving are expected to be **negligible** to **minor** adverse.

Vibratory pile driving could be used to install cofferdams for the RWEC sea-to-shore transition at Quonset Point. Similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles from vibratory pile driving are expected because of the combination of minimization measures used and the low densities of sea turtles in the RWF and RWEC. Noise from vibratory pile driving at the sea-to-shore transition would be constrained within the natural geography of Narragansett Bay. Vibratory pile-driving noise is unlikely to exceed recommended sea turtle injury thresholds and would only exceed behavioral thresholds within 175 feet of the source (BOEM 2021a). Given the limited spatial extent of these potential effects, sea turtles are more likely to respond to disturbance from construction vessels staging on-site before pile driving begins. This suggests that the potential for exposure to vibratory pile-driving noise is limited at best, with vessel noise and disturbance being the more likely source of potential behavioral effects.

HRG surveys use a combination of sonar-based methods to map shallow geophysical features. Up to 10,755 linear miles of preconstruction surveys would be conducted to support Project installation. The equipment is towed behind a moving survey vessel attached by an umbilical cable. HRG equipment operating at frequencies below 2,000 Hz (typically sub-bottom profilers) may be audible to sea turtles. Equipment such as echosounders and side-scan sonars operate at higher frequencies andwould be outside the hearing range of sea turtles,therefore having no effect on these species. The equipment only operates when the vessel is moving along a survey transect, meaning that the ensonified area is intermittent and constantly moving. BOEM (2021b) evaluated evaluated potential underwater noise effects on sea turtles from HRG surveys and concluded there is no possibility of PTS in sea turtles from HRG sound sources because of the brief and intermittent disturbances that a vessel could have on individuals. Some HRG survey noise sources would exceed the behavioral effects threshold up to 300 feet from the source, depending on the type of equipment used, but given the limited extent of potential noise effects and the EPMs used in this Project (e.g., soft start measures, shutdown procedures, protected species monitoring protocols, use of qualified and NOAA-approved PSOs, and noise attenuation systems), adverse impacts to sea turtles are unlikely to occur. While low-level behavioral exposures could occur, these would be limited in extent and temporary in duration (BOEM 2021b). Therefore, underwater noise impacts from HRG surveys are expected to be **minor** adverse.

The relatively low frequency range of turtle hearing (100–1,200 Hz) (Ketten and Bartol 2006; Lavender et al. 2014) overlaps the broad frequency spectrum of noise produced by vessels (10–1,000 Hz). Sea turtles could respond to vessel approach and/or noise with a startle response and a temporary stress response (NSF and USGS 2011). However, Hazel et al. (2007) suggested that turtles could habituate to vessel sounds in marine areas that experience regular vessel traffic. This could reduce the behavioral impacts of vessel noise but could increase the potential for vessel collision (refer to Vessel traffic below).

Underwater noise generated by construction vessels would not exceed injury thresholds for turtles, as noise levels produced by vessels in general are below levels that could cause potential auditory threshold shifts. Behavioral responses to vessels have been reported but are thought to be more associated with visual cues, as opposed to auditory cues (Hazel et al. 2007), although both senses likely play a role in avoidance. A conservative assumption is that construction and support vessels could elicit behavioral changes in individual sea turtles near the vessels. It is assumed that these behavioral changes would be limited to evasive maneuvers such as diving, changes in swimming direction, or changes in swimming speed to distance themselves from vessels. Overall, impacts to sea turtles from vessel noise would be **negligible** adverse.

Fixed-wing aircraft could be used during construction for marine mammal monitoring, and helicopters could be used for crew transport to and from construction vessels. Monitoring aircraft would operate at an altitude of 1,000 feet. Noise levels generated by helicopters and propeller-driven aircraft at this altitude range from 65 to 85 dBA (Behr and Reindel 2008; Brown and Sutherland 1980). Noise from crew transport helicopters would increase during approach and departure from vessel landing pads. Currently, no published studies describe the impacts of aircraft overflights on sea turtles, although anecdotal reports indicate that sea turtles respond to aircraft by diving (BOEM 2017). While helicopter traffic could cause some temporary non-biologically significant behavioral reactions, including startle responses (diving or swimming away), altered submergence patterns, and a temporary stress response (BOEM 2017; NSF and USGS 2011; Samuel et al. 2005), these brief responses would be expected to dissipate once the aircraft has left the area. The potential effects of aircraft noise and disturbance on sea turtles are therefore expected to be **negligible** adverse.

Overall, based on the limited likelihood of exposure and implementation of effective EPMs and minimization measures, the noise effects on sea turtles during construction would be **negligible** to **minor** adverse.

Presence of structures: Effects on sea turtles from the construction and installation of WTG and OSS foundations would result primarily from underwater noise impacts related to impact pile driving and noise and disturbance from associated vessel activity. These impacts are described under the applicable IPFs for each type of disturbance. Indirect effects on sea turtles, such as reduced availability of forage or prey, could also result from impacts on benthic habitat and invertebrate prey species. These effects, including the anticipated acreages of benthic habitat affected by the presence of structures, are described in Sections 3.6.2.2.1 and 3.6.2.3.1. While indirect effects to invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for sea turtles because of their broad resource base and the minimal anticipated adverse effect to invertebrates during the construction phase. Therefore, construction and installation of offshore structures would have temporary, **negligible** to **minor** adverse effects on sea turtles, varying in significance by species.

Vessel traffic: Changes in vessel traffic resulting from the Proposed Action are a potential source of adverse effects on sea turtles. Propeller and collision injuries from boats and ships are common in sea turtles and an identified source of mortality (Hazel et al. 2007; Shimada et al. 2017). Hazel et al. (2007) also reported that individuals may become habituated to repeated exposures over time, when not accompanied by an overt threat. Project construction vessels could collide with sea turtles, posing a temporary increase in the risk of injury or death to individual sea turtles. However, implementation of a range of EPMs to avoid vessel collisions (see Appendix F, Table F-1) are expected to minimize the risk of

collisions with sea turtles. These include strict adherence to NOAA guidance for collision avoidance and a combination of additional measures, including speed restrictions to 10 knots or less for all vessels at all times between November 1 and April 30 and speed restrictions to 10 knots or less in DMAs. All vessel crews would receive training to ensure these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 1 and approximately 4 knots, respectively.

Based on information provided by Revolution Wind (Tech Environmental 2021), BOEM estimates that Project construction would require up to 968 one-way trips by various classes of vessels between the RWF and regional ports in Rhode Island, Massachusetts, Connecticut, New Jersey, Virginia, and Maryland, as well as ports in Europe, over the 2-year construction period. This equates to approximately 40 trips per month, or 484 trips per year. In addition, approximately 10,755 linear miles of preconstruction HRG surveys are anticipated to support micrositing of the WTG foundations and cable routes. HRG surveys could occur during any month of the year and would require a maximum of 248 total vessel days. The construction vessels used for Project construction are described in Table 3.3.10-3 in the COP and include jack-up WTG installation vessels, foundation installation vessels, supply vessels and feeder barges, bunkering vessels, cable laying vessels, and various support craft. Typical large construction vessels used in this type of project range from 325 to 350 feet in length, from 60 to 100 feet in beam, and draft from 16 to 20 feet (Denes et al. 2021).

Large construction vessels and barges would account for an estimated 44% of these one-way trips, with the remainder comprising CTVs and other small support vessels. BOEM developed a representative analysis of construction vessel effects on regional traffic volume by evaluating the potential increase in transits across a set of analysis cross sections relative to baseline levels of vessel traffic. These cross sections were developed by DNV GL Energy USA, Inc. (2020) to support the COP and are shown in Figure 3.15-2.

Using the port of origin information provided by Revolution Wind (Tech Environmental 2021), the estimated 484 construction vessel trips per year would cross transects 13-17 when leaving the RWF and could cross several different transects depending on the destination port. This would equate to a 23% increase in vessel transits across these transects. However, the Automatic Identification System (AIS) data used in transect analysis do not include many recreational vessels and virtually all commercial fishing vessels when actively fishing. These vessel types account for the vast majority of vessel activity. For example, DNV GL Energy USA, Inc. (2020) estimated over 19,000 one-way trips per year by commercial fishing vessels between the RWF and area ports. When these vessel trips are included, Project construction would result in a 2.1% increase in vessel transits per year across transects 13-17. In summary, this assessment indicates that construction vessels would likely increase vessel traffic to some degree, and large vessel traffic would measurably increase during the 2-year construction period. This indicates the potential for increased risk of sea turtle collisions in the absence of planned EPMs and other requirements.

Sea turtles are likely to be most susceptible to vessel collision in coastal foraging areas crossed by construction vessels traveling between the RWF and offshore RWEC and area ports. Hazel et al. (2007) indicated that sea turtles may not be able to avoid being struck by vessels at speeds exceeding 2 knots,

and collision risk increases with increasing vessel speed. Habituation to noise may also increase the risk of vessel collision. However, avoidance behaviors observed suggest that a turtle's ability to detect an approaching vessel is more dependent on vision than sound, although both may play a role in eliciting behavioral responses. Construction vessel speeds could periodically exceed 10 knots during transits to and from area ports, posing an increase in collision risk relative to baseline levels of vessel traffic. During construction, vessels generally either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable-laying vessels move slowly, on the order of 3 to 30 miles per day, with a maximum speed of approximately 1.2 miles per hour. Project EPMs include the implementation of NOAA vessel guidelines (see Appendix F) for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions. Nevertheless, collisions with individual turtles could occur, resulting in mortalities. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes during Project construction would be low and would have negligible effects at the population level. Therefore, the potential effects of construction vessel collisions on sea turtles would be **minor** adverse.

Onshore Activities and Facilities

Construction of onshore Project facilities and associated activities would not result in measurable impacts on the marine environment. Therefore, onshore activities and facilities would have no measurable effect on sea turtles and would therefore be **negligible** adverse.

3.19.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: The RWF would undergo maintenance as needed, which would necessitate vessels and other equipment at the facility for the life of the Project. This presents an opportunity for accidental discharge or spills of fuels and/or fluids during maintenance activities. Spill response EPMs (see Table F-1 in Appendix F) employed during construction would be implemented during maintenance activities. These EPMs are expected to avoid or minimize water quality impacts from accidental spills or releases of pollutants during O&M activities. Impacts on sea turtles from accidental spills or releases of pollutants are considered **minor** adverse because of the low probability of the risk and EPMs (refer to Section 3.21 for additional details).

Noise: WTG operations, O&M and monitoring vessels, and postconstruction HRG surveys would generate underwater noise detectable by sea turtles. Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the RWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 dB re 1 µPa SPL rms) (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This

suggests that operational noise effects on sea turtles could be greater than those considered herein, but these findings have not been validated. The Project would generate operational noise throughout the life of the RWF. As noted previously, sea turtle hearing is largely within the frequency range (< 1,200 Hz) for operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold.

Little is known currently about how sea turtles use hearing in their natural environment (Lavender et al. 2014); therefore, it is difficult to interpret the potential effects of long-term, non-impulsive noise generated by the WTGs. O'Hara and Wilcox (1990) reported that loggerheads avoid sources of low-frequency sound in the 25- to 1,000-Hz range. The sound levels produced during operation are less than the behavioral and injurious thresholds defined by NMFS for sea turtles. However, potential responses to underwater noise generated by WTG operation could include avoidance of the noise source. Operational noise levels would not cause injury to sea turtles but could alter the behavior of individuals close to the structure. Localized behavioral long-term effects from operational noise would be **negligible** adverse because of the limited likelihood of behavioral effects.

While sea turtles would likely be able to detect O&M vessels in the vicinity, this would not necessarily translate to biologically significant effects. For example, Hazel et al. (2007) concluded that sea turtles appear to be relatively insensitive to vessel noise, relying on their vision to detect approaching vessels. Sea turtles may respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NFS and USGS 2011). In contrast, Samuel et al. (2005) indicated that vessel noise can affect sea turtle behavior, especially their submergence patterns. BOEM anticipates that the potential effects of noise from O&M vessels would elicit brief responses to the passing vessel that would dissipate once the vessel or the turtle left the area. For these reasons, BOEM anticipates that sea turtle exposure to vessel noise would be minimal, and responses if any, would be temporary and biologically insignificant, with individuals returning to normal behaviors once the vessel has passed.

Up to 1,062 linear miles of postconstruction HRG surveys could be conducted each year for the first 4 years of Project operations to ensure transmission cables are maintaining desired burial depths. This equates to approximately 25 days of HRG survey activity per year. The related effects on sea turtles would be similar in nature to those described for construction-related HRG surveys in Section 3.19.2.2.1 but reduced in extent and duration. The limited behavioral responses to HRG survey equipment and vessels would be similar to those described above for general O&M vessel noise.

Project decommissioning would require the use of construction vessels of similar number and class as those used during construction. Underwater noise and disturbance levels generated during decommissioning would be similar to those described above for construction, with the exception that pile driving would not be required. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). Therefore, this decommissioning equipment would not contribute to additional noise effects above and beyond those already considered for construction vessel noise. The short-term effects of Project decommissioning on sea turtles would therefore range from **negligible** to **minor** adverse.

Presence of structures: The WTG and OSS foundations, exposed portions of the offshore RWEC, and associated scour protection would result in a long-term conversion of existing complex and non-complex

bottom habitat to new stable, hard surfaces. Once construction is complete, these surfaces would be available for colonization by sessile organisms and would draw species that are typically attracted to hard-bottom habitat (Causon and Gill 2018; Langhamer 2012). Refer to Section 3.6.2.2.2, 3.6.2.3.2, and 3.13.2.2 for a detailed overview of potential changes in food web dynamics caused by reef effects. Over time, this reef effect would increase the amount of forage and shelter available for sea turtles.

The WTG and OSS foundations constitute potential obstacles in the water column for the life of the Project until decommissioning. Given that sea turtles are highly mobile and the structures are only 36 to 45 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to pose a direct barrier to foraging, migration, or other behaviors of sea turtles. However, the presence of WTG structures could indirectly affect sea turtles by potentially altering prey distribution or promoting fish aggregations and thus concentrating fishing vessels at the foundations. This range of potential impacts is discussed in the following paragraphs.

Human-made structures, especially tall, vertical structures like WTG and OSS foundations, may also alter local water flow at a fine scale and could result in localized impacts on sea turtle prey distribution and abundance. These localized effects typically dissipate within a relatively short distance from the structure (Miles et al. 2017); effects would likely dissipate within 300 to 400 feet of each monopile foundation. However, there is potential for regional impacts to wind wave energy, mixing regimes, and upwelling (van Berkel et al. 2020), and these changes in water flow caused by the presence of the WTG structures could influence sea turtle prey distribution at a broader spatial scale. The distribution of fish, invertebrates, and other marine organisms on the OCS is determined by the seasonal mixing of warm surface and cold bottom waters, which determines the primary productivity of the system (Chen et al. 2018; Lentz 2017; Matte and Waldhauer 1984). While there is a high degree of uncertainty, the presence of WTG structures could affect conditions in ways that alter these dynamics, potentially increasing primary productivity in the vicinity of the structures by disrupting vertical stratification and bringing nutrient-rich waters to the surface (Carpenter et al. 2016; Schultze et al. 2020). However, this increase in primary productivity may not translate to a beneficial increase in sea turtle prey abundance if the increased productivity is consumed by filter feeders, such as mussels, that colonize the surface of the structures (Slavik et al. 2019). Considering the largely localized nature of potential effects to primary production surrounding WTGs (van Berkel et al. 2020), the likelihood of broader benefits for sea turtles is minimal.

The overall effects of offshore structure development on ocean productivity, sea turtle prey species, and, therefore, sea turtles, are difficult to predict with certainty and are expected to vary by location, season, and year, depending on broader ecosystem dynamics. The addition of up to 102 new offshore foundations could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014). These aterations may increase foraging opportunities for loggerhead and Kemp's ridley sea turtles with preferences for more bottom-dwelling invertebrate prey. Increased primary and secondary productivity in proximity to structures could also increase the abundance of jellyfish, a prey species for leatherback sea turtles (English et al. 2017; NMFS and USFWS 1992). The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In contrast, broadscale hydrodynamic impacts could lead to localized changes in zooplankton distribution and abundance (van Berkel et al. 2020). As discussed in Section 3.6.2.3.2, hydrodynamic modeling conducted

by Johnson et al. (2021) indicated project-related shifts in larval transport and settlement density, but these shifts are not expected to have broad-scale impacts on invertebrate populations. There is considerable uncertainty as to how these localized ecological changes would affect sea turtles and how those changes would interact with other human-caused impacts. The effect of these IPFs on sea turtles and their habitats could be positive or negative, varying by species, and their extent and magnitude is unknown. Recent studies have also found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, sea turtles, and birds, around offshore wind facilities (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), translating to potential increased foraging opportunities for sea turtle species. However, an increase in biomass could result in limited benefits to higher trophic levels, depending on species composition and prey preferences (Pezy et al. 2018).

Increased fish biomass around the structures could also attract commercial and recreational fishing activity, creating an elevated risk of injury or death from gear entanglement and ingestion of debris (Barreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). As noted above, lost/discarded fishing gear was associated with a majority of sea turtle entanglements in a global review (Duncan et al. 2017). However, through implementation of EPMs related to management of debris surrounding the WTGs (see Table FF-1 in Appendix FF), the increase in entanglement risk is expected to be minimal.

The presence of structures could result in multiple types of impacts, with potentially opposing outcomes for sea turtles. The presence of structures could indirectly concentrate recreational fishing around foundations, which could indirectly increase the potential for sea turtle ingestion of or entanglement in lines, nets, and other lost or discarded fishing gear (Gall and Thompson 2015; Nelms et al. 2016; Shigenaka et al. 2010). However, the addition of structures could benefit sea turtles by locally increasing pelagic productivity and prey availability for sea turtles. The overall impact to sea turtles is not expected to be biologically significant due to the patchy distribution of sea turtles in the northern portion of the GAA where the RWF and RWEC are located. Potential long-term, intermittent impacts could persist until decommissioning is complete and structures are removed. These impacts would be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.

Decommissioning would remove the structures from the water column and effectively eliminate any operational effects of the presence of structures. No specific methods for decommissioning and removal of structures have been proposed, as the planned removal would occur at the end of the Project lifetime. The COP provides no indication that decommissioning would involve lines, rigging, or other equipment that could pose a potential entanglement risk to sea turtles. The Project would develop a decommissioning plan that specifies the methods and equipment proposed for structure removal. That plan would be subject to independent environmental compliance and regulatory review.

Vessel traffic: Revolution Wind (Tech Environmental 2021) has estimated that Project O&M would involve up to four CTV and two SOV trips per month for wind farm O&M, or 2,280 vessel trips over the life of the Project. These trips would originate either from an O&M facility located either in Montauk, New York, or Davisville, Rhode Island. One or more CTVs ranging from 62 to 95 feet in length would be purpose built to service the RWF over the life of the Project. SOVs are larger mobile work platforms, on the order of 215 to 305 feet long and 60 feet in beam, equipped with dynamic positioning systems used for more extensive, multiday maintenance activities (Ulstein 2021). Larger vessels similar to those used for construction could be required for unplanned maintenance, such as repairing scour protection or replacing damaged WTGs. Those activities would occur on an as-needed basis. Additional vessel trips

would be required over the life of the Project forseafloor surveys and subsurface inspections. A minimum of three postconstruction seafloor bathymetry surveys would be conducted to assess foundation scour and correct if needed. Project fishery monitoring and benthic habitat monitoring surveys would also be conducted annually, as discussed above. Vessels used would be similar to those used for preconstruction HRG surveys.

In general, O&M-related vessel activities would represent a small increase in regional vessel traffic compared to existing conditions. Project O&M could involve up to 10 one-way vessel trips between the RWF and O&M facility or other area ports each month. By comparison, hundreds of large vessels and thousands of smaller vessels, many of the latter comparable in size to a CTV, travel through the areas between the wind farm and proposed O&M facility locations each month (Section 3.15.2.2.1). O&M vessel use would therefore represent a minimal increase in regional vessel traffic over the life of a facility and the effects to sea turtles are expected to be negligible adverse.

As detailed in Appendix F, all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with sea turtles, making the risk of vessel strikes from Project monitoring vessels unlikely. As described in the previous section, the applicant has voluntarily committed to specific EPMs, including vessel timing and speed restrictions, to avoid and minimize vessel-related risks to sea turtles (see Appendix F, Table F-1). Based on the generally low density of sea turtles in the Lease Area and the anticipated vessel trips during operations, there is a low risk of encountering a sea turtle. The operational conditions combined with planned EPMs (see Appendix F for all vessel strike avoidance measures) would minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid sea turtles. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and implementation of effective monitoring and EPMs. BOEM concludes vessel strikes have a low probability of occurrence and therefore would have a minor anticipated effect on sea turtles. In the unlikely event of a sea turtle strike by any vessel supporting the Project, Revolution Wind must immediately cease the activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA) and COP approval conditions.

As with construction, a similar increase in vessel round trips during decommissioning is expected to increase the relative risk of vessel strike for sea turtles. The implementation of NOAA guidelines (see Appendix F) as an EPM is intended to minimize the potential of vessel strikes for sea turtles by reducing vessel speed and maintaining a separation distance from sighted turtles. Collisions, if they do occur, are expected to be fatal to individuals. Because the abundance of sea turtles in the RWF and RWEC is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic is also low, the number of sea turtles injured or killed by vessel strikes as a result of Project decommissioning would be low and would have negligible effects at the population level. Therefore, potential effects of vessel strikes on sea turtles from vessels supporting Project decommissioning would be minor adverse. Overall, the anticipated effect to sea turtles from vessel traffic associated with O&M and decommissioning would be **negligible** to **minor** adverse.

Onshore Activities and Facilities

Onshore Project activities would not result in impacts to marine resources. Therefore, impacts to sea turtles from O&M and decommissioning of the Proposed Action would be the same as under the No Action Alternative: **negligible** adverse.

3.19.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: Toxic contaminants and marine debris are recognized as significant sources of sea turtle injury and mortality and are leading threats to successful species conservation and recovery. The Proposed Action would increase commercial vessel activity on the OCS, creating a potential source for accidental spills, trash, and debris. BOEM estimates that the Project would result in a negligible, up to 5% increase in total chemical usage in the GAA relative to the No Action Alternative. When combined with other offshore wind projects, up to approximately 19 million gallons of coolants, oils, fuels, and lubricants could cumulatively be stored within WTG foundations and the OSS within the GAA. Compliance with USCG regulations and BOEM requirements to minimize the risk of accidental spills and/or release of trash and debris would limit the volume and extent of Project-related trash/debris or invasive species potentially released accidentally. Additionally, as discussed in Section 3.19.1.1, the volumes of trash/debris potentially released accidentally under the No Action Alternative would be negligible and would not contribute to potential adverse impacts. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse because of the regulatory protections and limited likelihood of sea turtle exposure.

Climate change: The types of impacts from global climate change described for the No Action Alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. As described in Section 3.19.1.1, the interactions between climate change and other potential impacts associated with the Proposed Action are complex and difficult to predict with certainty. Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and could represent an increasing impact over the life of the Project. Based on the potential for increased exposure to the various effects of the Proposed Action described above, the Proposed Action when combined with other past, present, and reasonably foreseeable actions is expected to result in **minor** adverse cumulative impacts to sea turtles due to the anticipated shifts in distributions.

Noise: The Proposed Action would result in localized, temporary, negligible to minor impacts to sea turtles through the generation of impulsive and non-impulsive underwater noise associated with offshore wind construction activities. BOEM estimates a cumulative total of 3,110 offshore WTGs and OSS foundations could be developed in the GAA for sea turtles between 2022 and 2030. Sea turtles are anticipated to occur at generally low densities (see Section 3.19.1) near wind farms in the region, reducing the probability of individual exposure to noise effects. Noise sources associated with the Proposed Action could add to the ambient noise environment under the No Action Alternative if noise sources overlap temporally or geographically. Pile driving would represent the most significant source of noise. As noted in Section 3.19.1.1, there are three possible exposure scenarios for pile-driving noise:

1) concurrent exposure from two or more impact hammers for the same or adjacent projects; 2) non-concurrent exposure from multiple pile-driving events in the same years; 3) exposure to concurrent and non-concurrent pile-driving events over multiple years. Although the extent, duration, and magnitude of exposure would vary based on Project -specific factors, the effects would be similar in nature to those described for the Proposed Action. Although exposure to pile-driving noise could disrupt behaviors of individual sea turtles, it is not expected to impair essential behavioral patterns. This is due to the temporary, localized nature of the effects and because normal behaviors are expected to resume once the sea turtle is no longer exposed to the noise. Permanent hearing impairment could occur to some individuals, but science has not determined whether if changes in hearing ability would negatively impact the ability of sea turtles to feed, navigate, find suitable habitats, and reproduce. Due to the limited information about noise-related stress responses in sea turtles, physiological stress responses may likely occur concurrently with any other response, such as hearing impairment or behavioral disruptions.

For impulsive noise, BOEM anticipates that projects would employ soft starts during pile driving to allow the small number of turtles in the region to leave the area before underwater noise increases to injurious levels. Additionally, the implementation of sound attenuation systems, PSO monitoring and clearance zones, and other planned EPMs (see Appendix F) would further reduce the likelihood of injury from the potential moderate cumulative impacts associated with pile driving. Vibratory pile driving associated with the sea-to-shore transition would create non-impulsive underwater noise, but similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles are expected because of the combination of minimization measures used and the low densities of sea turtles in the RWF and RWEC. Potential behavioral effects are more likely to be related to vessel noise and disturbance than the vibratory pile driving itself.

With regard to other non-impulsive noise sources, potential behavioral impacts on sea turtles from vessel traffic noise would be intermittent and temporary as animals and vessels pass near each other. During construction and operation, helicopter traffic could cause some temporary behavioral reactions in sea turtles, but energy expenditures would be minimal.

Based on the above findings, noise-related impacts of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts to sea turtles, depending upon the noise source.

Presence of structures: The Proposed Action would result in long-term negligible and minor beneficial impacts to sea turtles through the installation of 102 structures (100 WTGs and two OSSs) to conditions under the No Action Alternative. The installation of monopile foundations would alter the character of the ocean environment, and their presence could affect sea turtle behavior. Increased prey availability, attraction to structures, and/or displacement could occur as a result of the installation of WTG facilities. As described in Section 3.19.2.2.2, structures associated with offshore wind farms are expected to provide some level of reef effect and could benefit sea turtle foraging by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting prey aggregations on foundations.

Some level of displacement of sea turtles out of the Lease Area and into areas with a higher potential for interactions with ships or recreational or commercial fishing gear could occur, particularly during construction phases, when elevated underwater noise levels occur. These intermittent impacts would persist until decommissioning is complete and structures are removed. Impacts could occur as a result of

increased interaction with fishing gear, although annual monitoring, reporting, and cleanup of fishing gear around the base of the WTGs would reduce the extent of these impacts.

BOEM estimates a cumulative total of 3,110 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the GAA. For similar reasons as described above, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse cumulative impacts and potential **minor** beneficial cumulative impacts to sea turtles.

Vessel traffic: The Proposed Action would result in minor impacts to sea turtles through the addition of construction and maintenance vessels within the GAA. This increased offshore wind-related vessel traffic during construction, and associated noise impacts, could result in localized, intermittent impacts on sea turtles, resulting in brief minor behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. However, BOEM expects that these brief responses of individuals to passing vessels would be unexpected given the patchy distribution of sea turtles; no stock- or population-level effects would be expected. Additionally, the Proposed Action would implement EPMs (see Table F-1 in Appendix F) to minimize vessel strikes.

BOEM estimates a peak of 380 vessels supporting offshore wind development will be operating in the GAA over the next decade, of which up to 61 would be associated with the Proposed Action construction and six would be associated with O&M. This increase in vessel traffic poses an increased likelihood of collision-related injury and mortality relative to existing baseline conditions. Some sea turtlescould be injured or killed as a result, but the number of individuals impacted is not likely to significantly increase the existing mortality rate from vessel strikes. Additionally, BOEM expects that similar EPMs will be included in future offshore wind projects, helping to minimize the vessel strike risk. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be **minor** adverse; however, BOEM does not expect the viability of sea turtle populations to be affected.

Onshore Activities and Facilities

Onshore Project activities would not result in impacts to marine resources. Therefore, cumulative impacts to sea turtles from onshore activities associated with all past, planned, and reasonably foreseeable future activities would be the same as under the No Action Alternative: **negligible** adverse.

3.19.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would impact sea turtles through exposure to vessel traffic, underwater noise impacts, temporary habitat disturbance, and long-term habitat conversion. Individual sea turtles could be injured or killed by vessel collisions and underwater noise exposure during ProjectP construction, but the exposure risk is low and the number of individuals impacted would likely be small. Temporary habitat disturbance, including alteration of the seafloor and suspended sediment and burial effects, would be limited in extent and well below levels likely to have biologically significant effects on any sea turtle species. Reef effects created by the presence of offshore wind structures could beneficially increase foraging opportunities for species, such as loggerhead sea turtles, that forage on benthic crustaceans and other invertebrates.

On this basis, BOEM anticipates that the Proposed Action would result in **negligible** adverse to **minor** impacts to sea turtles, including **minor** beneficial impacts for species that are able to exploit the increased biological productivity created by reef effects on offshore wind structures. Overall, the impacts of the Proposed Action alone on sea turtles would likely be **minor** beneficial to **minor** adverse. Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM does not anticipate that these combined effects would alter the overall significance determination because they would not alter impacts on any species to such a degree that measurable population-level effects would occur.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from negligible to minor adverse and minor beneficial for some sea turtle species. The impact-level criteria are used to characterize effects of all IPFs. Applying these criteria, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts on sea turtles in the GAA because unavoidable adverse impacts on individual sea turtles could occur that coincide with other adverse effects resulting from climate change, but those impacts are unlikely to measurably affect the viability of any sea turtle species at the population level.

3.19.2.3 Alternatives C, D, E, and F

3.19.2.3.1 Construction and Installation

Offshore Activities and Facilities

Noise: Construction of Alternatives C through F would result in similar underwater noise impacts on sea turtles from foundation installation to those described for the Proposed Action in Section 3.19.2.2.1, but those impacts would be reduced in extent and duration because fewer structures would be installed. This would reduce the number of days of impact pile driving required to construct the Project and the associated extent and duration of underwater noise. Reducing the number of structures could also reduce the required extent of HRG surveys under each alternative relative to the Proposed Action, but BOEM has insufficient information to determine if this is the case. The potential distribution of UXOs within the RWF is not currently known, but the largest devices are most likely to be encountered within the central portion of the RWF and in state waters on the RWEC corridor at the mouth of and outside of Narragansett Bay (Ordtek 2021). The RWEC configuration would remain the same across all alternatives, and the probable area of occurrence within the RWF is sufficiently large that it is not possible to determine how changes in alternative configuration would affect the likelihood of UXO encounters. Therefore, impacts to sea turtles from HRG surveys and UXO detonation are considered to be the same across all alternatives.

Differences in the extent and duration for the Proposed Action and the different configurations proposed for Alternatives C through E are summarized in Tables 3.19-5, 3.19-6, and 3.19-7, respectively, based on the total number of WTG and OSS foundations requiring pile driving and underwater noise injury and behavioral effects thresholds. These tables display the number of structures installed and estimated days of pile-driving activity required to construct each alternative. As shown, while the extent and duration of potential noise exposure from impact pile-driving activities would vary between layouts, these effects would be similar in magnitude and general scale to the Proposed Action. Therefore, noise effects on sea turtles from the construction phase of each alternative would likewise vary by species and range from **negligible** to **minor** adverse. The potential use of larger capacity WTGs under Alternative F could result

in more extensive operational noise impacts than the Proposed Action, but insufficient information is available to characterize differences in effect.

Table 3.19-5. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) to Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for the Habitat Alternative*

Exposure Type	Threshold Distance (feet)†	Proposed Action	C1	C2
Peak injury	–	100 sites/ 35 days	64 sites/ 22 days	65 sites/ 22 days
Cumulative injury	98–689			
Behavioral or TTS	1,903–2,920			

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

Table 3.19-6. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) for Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for the Transit Alternative*

Exposure Type	Threshold Distance (feet)†	Proposed Action	D1	D1+D2	D1+D2+D3	D1+D3	D2	D2+D3	D3
Peak injury	–	100 sites/ 35 days	93 sites/ 31 days	92 sites/ 31 days	93 sites/ 31 days	85 sites/ 28 days	86 sites/ 29 days	85 sites/ 28 days	78 sites/ 26 days
Cumulative injury	98–689								
Behavioral	1,903–2,920								

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

Table 3.19-7. Comparison of Maximum Underwater Noise Injury and Behavioral Effects Exposure Extent and Duration (number of sites/days) for Sea Turtles from Revolution Wind Farm Foundation Installation for the Proposed Action and Proposed Configurations for the Viewshed Alternative*

Exposure Type	Threshold Distance (feet)†	Proposed Action	E1	E2
Peak injury	–	100 sites/5 days	64 sites/21 days	81 sites/27 days
Cumulative injury	98–689			
Behavioral	1,903–2,920			

* Installation scenario for 12-m monopile is 6,500 strikes/pile at installation rate of three piles/day. All piles installed with a 4,000-kJ hammer with an attenuation system achieving 10 dB sound source reduction.

† Threshold distances are the distance in feet from the sound source where the identified type of exposure could occur. WTG values are the range threshold distances for monopile installation modeled by Kusel et al. (2021) across modeled sites and seasonal conditions.

Presence of structures: The presence of WTG and OSS monopile foundations associated with Alternatives C through F would result in similar impacts to sea turtles as those described for the Proposed Action in Section 3.19.2.2.2, but those impacts would be reduced in extent and would vary depending on the alternative selected. Refer to the tables in Section 3.6.2.4.2 for a summary of the number of structures proposed by alternative and configuration. Impacts of the presence of structures are expected to be relative to the total number of structures proposed (i.e., fewer structures would result in a smaller extent of impacts).

As with the Proposed Action, the overall impact to sea turtles from the presence of structures is not expected to be biologically significant due to the patchy distribution of sea turtles within the RWF and RWEC. Impacts from the presence of structures are expected to vary in relation to the total number of foundations proposed (i.e., fewer structures would result in less extensive impacts). For example, both configurations of Alternative C and Alternative E1 propose noticeably fewer WTG and OSS foundations compared to the Proposed Action and most configurations of Alternative D. Therefore, these alternatives would be expected to produce noticeably reduced impacts from this IPF by comparison. In general, presence of structures effects on sea turtles under Alternatives C through F would likely be less extensive compared to those resulting from the Proposed Action. Reef effects would be reduced commensurate with the number of foundations constructed under each alternative configuration.

At present, insufficient information is available to determine if differences in Project configuration between alternatives, specifically where foundations are located relative to sensitive benthic habitats, would contribute to a measurable difference in reef effects on sea turtles beyond those resulting from a simple reduction in the number of structures. As stated in Section 3.15.2.2.3, hydrodynamic effects are likely to lead to localized changes in the distribution of planktonic organisms (e.g., jellyfish) for certain sea turtle species, but shifts in prey distribution on the order of miles to tens of miles are unlikely to be biologically significant for species that migrate thousands of miles between seasonal habitats every year. Increased biological productivity resulting from reef effects could concentrate recreational fishing around foundations, which could theoretically increase the potential for harmful interactions with fishing gear. However, these reef effects would also benefit certain sea turtle species by increasing and concentrating prey availability. Therefore, while Alternatives C through F would likely alter and reduce the extent of measurable reef and hydrodynamic effects relative to the Proposed Action, those effects are likely to remain biologically insignificant. Potential long-term intermittent impacts would persist until decommissioning is complete and structures are removed. These impacts would also be **negligible** to **minor** adverse, offset by **minor** beneficial impacts to sea turtle species that benefit from reef effects.

3.19.2.3.2 Conclusions

The construction and installation, O&M, and decommissioning of Alternatives C through F would impact sea turtles through the same IPFs described for the Proposed Action. These impacts include exposure to increased vessel traffic, underwater noise impacts from Project construction and O&M, temporary habitat disturbance, and long-term habitat conversion. These adverse impacts would be avoided and minimized using the same EPM's as described in the Proposed Action (see Table F-1 in Appendix F). Alternatives C through F would also generate similar beneficial reef effects but over a smaller area and with a reduced number of reef-forming structures. The resulting effects to sea turtles would therefore be similar to those described for the Proposed Action but reduced in extent and/or duration. However, the overall reduction in impacts would not be sufficient to alter the impact determinations for any sea turtle species. On this

basis, BOEM concludes that Alternatives C through F would result in **minor** adverse effects to sea turtles, with those effects partially offset by **minor** beneficial impacts for some sea turtle species.

3.19.2.4 Mitigation

Additional mitigation measures identified by BOEM and cooperating agencies are described in detail in Appendix F, Table F-2 and below (Table 3.19-8).

Table 3.19-8. Proposed Mitigation Measures – Sea Turtles

Mitigation Measure	Description	Effect
Marine debris	Appropriate actions (e.g., training, marking, reporting) would be taken to minimize the potential for the introduction of trash and debris to the marine environment.	This measure would complement existing EPMs and regulatory requirements, ensuring that impacts from the accidental releases and discharges IPF would remain negligible adverse.
Sound field verification	Revolution Wind will develop a sound field verification plan and submit it to BOEM, the USACE, and NMFS for review and written approval at least 90 days prior to initiating underwater noise-producing construction activities. The sound field verification would provide the basis for established pre-start clearance and shutdown zones.	This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Passive acoustic monitoring	Revolution Wind will prepare a PAM plan to record ambient noise and vocalizations in the Lease Area. Acoustic monitoring will be implemented prior to and throughout the construction period and will continue for at least 2 years of Project operations after construction is complete. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during construction and meet postconstruction monitoring needs. Underwater acoustic monitoring will use standardized measurement methods and data processing and visualization metrics developed for the Atlantic Deepwater Ecosystem Observatory Network for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu). At least two PAM buoys will be independently deployed within or bordering the RWF Lease Area, or one or more buoys will be deployed in coordination with other acoustic monitoring efforts in the RI and MA lease areas.	This measure would not modify the impact determination for construction and operational noise effects on sea turtles but would improve understanding of these impacts on specific resources and inform future management and mitigation measures.
PSO coverage	BOEM, BSEE, and the USACE would ensure that PSO coverage is sufficient to reliably detect sea turtles	This measure would not modify impact determinations on sea

Mitigation Measure	Description	Effect
	at the surface in clearance and shutdown zones to execute any pile-driving delays or shutdown requirements.	turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Pile-driving monitoring	Revolution Wind will prepare a pile driving monitoring plan in coordination with the PAM plan. PAM data would be used to determine potential marine mammal presence in the vicinity of project activities. RWF will provide sufficient protected species observer (PSO) coverage to reliably detect marine mammals within established clearance and shutdown zones. PSOs must have effective visual monitoring of all clearance zones in all directions prior to the commencement of pile driving.	This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Shutdown zone and clearance zone adjustment	BOEM, BSEE, and NMFS may consider reduction adjustments in the pre-start clearance and/or shutdown zones based on the initial sound field verification measurements. If initial measurements indicate distances to sea turtles are greater than predicted by modeling assuming 10 dB attenuation, Revolution Wind will implement additional sound attenuation measures prior to conducting additional pile driving.	This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Monitoring zones for sea turtles	BOEM, BSEE, and the USACE would ensure that Revolution Wind monitors the full extent of the area where noise would exceed the 175 dB re 1 μPa^2 threshold for sea turtles for the full duration of all pile-driving activities and for 30 minutes following the cessation of pile-driving activities and record all observations in order to ensure that all take that occurs is documented.	This measure would not modify the impact determination for noise effects on sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Vessel strike avoidance measures for sea turtles	Between June 1 and November 30, Revolution Wind would have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles.	This measure comprises a set of requirements to review current sea turtle sighting information in the region, to maintain constant watch over a 500-meter vessel strike awareness zone during vessel transits, and to slow vessels to a speed of 4 knots or less when sea turtles are observed or likely to be present based on observed concentrations of prey. This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related effects on sea

Mitigation Measure	Description	Effect
		turtles, it would help to ensure that these effects do not exceed the levels analyzed herein.
Vessel communication	Visual observations of marine mammals will be communicated to all Project vessels to coordinate implementation of related EPMs and mitigation measures.	This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related effects on sea turtles, it would help to ensure that these effects do not exceed the levels analyzed herein.
Vessel speed restriction	All vessels, regardless of size, would comply with a 10-knot speed restriction in any SMA, DMA, or Slow Zone.	This measure would complement existing EPMs and ensure their effectiveness. While it would not modify the impact determination for vessel-related displacement effects on marine mammals, it would help to ensure that these effects do not exceed the levels analyzed herein.
Gear management	Sampling or survey gear would be regularly maintained and monitored to limit the potential for entanglement. Gear would be uniquely marked, and all reasonable efforts would be undertaken to recover lost gear.	This measure would complement existing EPMs and ensure that entanglement risk associated with survey activities and potential impacts on sea turtles remain negligible.
Sea turtle disentanglement	Vessels deploying fixed gear (e.g., pots/traps) would have adequate disentanglement equipment (i.e., knife and boathook) onboard. Any disentanglement would occur consistent with the Northeast Atlantic Coast Sea Turtle Disentanglement Network Guidelines.	This measure would complement existing EPMs and ensure that entanglement risk associated with fixed gear and potential impacts on sea turtles remains negligible.
Sea turtle data	Any sea turtles caught and/or retrieved in survey gear would be identified to species or species group, properly documented, and data collected, then live, uninjured animals would be returned to the water as quickly as possible after completing the required handling and documentation.	This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Sea turtle handling	Atlantic sturgeon caught and/or retrieved in survey gear would be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so.	This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

Mitigation Measure	Description	Effect
Take notification	GARFO PRD would be notified as soon as possible of all observed takes of Atlantic sturgeon occurring as a result of any fisheries survey.	This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.
Reporting	BOEM and BSEE would ensure that Revolution Wind submits regular (e.g., monthly) reports to document the amount of extent of take that occurs during all phases of the Proposed Action.	This measure would not modify the impact determination for any IPF but would contribute to improved understanding of marine mammal use of the RWF and vicinity.
Data collection	BOEM and BSEE would ensure that all Project design criteria and BMPs incorporated in the Atlantic data collection consultation for offshore wind activities (Baker and Howson 2021) shall be applied to activities associated with the construction, maintenance and operations of the Revolution Wind Project as applicable.	This measure would not modify the impact determination for sea turtles but would provide the information necessary to ensure that these effects do not exceed the levels analyzed herein.

3.20 Visual Resources (see section in main EIS)

3.21 Water Quality

3.21.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Water Quality

3.21.1.1 Offshore Water Quality

Geographic analysis area: The GAA for offshore water quality impacts comprises coastal and marine waters within 10 miles of Project components and within 15.5 miles of waterways for ports that could be used during the Project (Figure 3.21-1). This analysis area was chosen by analyzing a worst-case scenario of an incidental oil discharge under the Project, which would equate to the simultaneous release of all oils used by all Project components and vessels.

Affected environment: Offshore waters in the offshore water quality analysis area comprise coastal waters (e.g., ports and harbors, bays, and estuaries; marine waters) located within the state territory (within 3 nm of shore) and within federal waters. The coastal waters, including the Long Island Sound, Block Island Sound, Rhode Island Sound, Narragansett Bay, and Atlantic Ocean, are located offshore and include existing port facilities in New York, Connecticut, Rhode Island, Virginia, Massachusetts, Maryland, and New Jersey that could be used for the Project. Because of their highly seasonal variations in temperature, stratification, and productivity, marine waters are considered temperate. Water currents near the shoreline of the landing site flow predominantly southwest and northeast, and water currents in the northern and southeastern portions of the offshore portion of the Lease Area flow predominantly south and east (RPS 2021). Along the proposed RWEC, currents were measured up to approximately 0.2 m/s, which increased to approximately 0.4 m/s at Narragansett Bay (RPS 2021).

Near the Lease Area, NOAA reported annual increases in relative sea level trends at seven tide stations (NOAA 2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g), including four along the Long Island coast (Bridgeport, Port Jefferson, New London, and Montauk), two along the Rhode Island coast (Newport and Providence), and one along the Massachusetts coast (Woods Hole) with increases ranging from approximately 2.4 millimeters per year at Providence, Rhode Island, to 3.41 millimeters per year at Montauk, New York. These increasing sea levels in addition to storm surges that are increasing in both frequency and magnitude have contributed to coastal erosion that has led to eroded shorelines and increased susceptibility to flooding (New York Sea Grant 2018; Rhode Island Coastal Resources Management Council 2014).

Offshore water quality is characterized by dissolved oxygen (DO), chlorophyll *a*, nutrients (phosphorus and nitrogen), pathogens, contaminants (metals, polychlorinated biphenyls [PCBs], and organic and inorganic pollutants), turbidity, and point and nonpoint source pollution. These parameters, which are described in COP Section 4.2.2 (vhb 2022), influence coastal and marine environments and are indicators of ecosystem health. In general, salinity levels in the region have low variability. Salinity ranged from 23.7 to 28.4 practical salinity unit (psu) in Narragansett Bay from 2005 through 2015, as well as 32 to 33 psu in the broader New England lease area between 1980 and 2007 (BOEM 2021a).

As described in COP Section 4.2.4 (vhb 2022), surface water temperatures fluctuate up to 59 degrees Fahrenheit (°F) seasonally, with bottom waters experiencing smaller seasonal temperature fluctuations of approximately 41°F. Water temperatures are highest in July and August when the water column becomes stratified; RWF surface water temperatures are close to 68°F, while bottom waters are approximately

50°F. During the winter, average surface water temperatures range from approximately 39°F to 41°F, with bottom waters staying slightly warmer at the southern edge of Rhode Island Sound.

The Project, including offshore facilities and ports, would be located within the northeast and mid-Atlantic regions of the United States, as defined by the EPA (2012). Overall water quality along the Atlantic coast has been rated "fair" to "good" (EPA 2012). The Mid-Atlantic region's water quality has been rated as generally "good," and the northeast region's water quality has been rated "fair" (EPA 2012). Water quality in the Long Island Sound from the Port Jefferson area eastward has generally improved or remained "very good" over the past decade (University of Maryland 2018). In general, water quality improves north to south from Narragansett Bay to the OCS (EPA 2012). Seventy percent of Rhode Island coastal waters are categorized as Type 1 (i.e., waters abut shorelines in natural undisturbed conditions) and Type 2 (i.e., waters are adjacent to predominantly residential areas; docks are allowed but other more intensive uses are not) (Rhode Island Division of Planning 2016). The water quality of estuarine waters off the coast of Rhode Island, including Narragansett Bay and nearby coastal ponds, has experienced degradation from nutrients and stormwater runoff carrying contaminants, although overall water quality in the area is generally good (Rhode Island Division of Planning 2016).

DO concentrations for offshore waters along the Atlantic coast and in the northeast region have been rated as generally "fair" (EPA 2012). DO concentrations have been rated as "good" within the Mid-Atlantic region (EPA 2012). Low DO concentrations have been measured at Long Island Sound monitoring stations (EPA 2012); however, water quality surveys at stations in the Rhode Island Sound revealed DO concentrations in surface and bottom waters above established levels for the "highest quality marine waters" (RI CRMC 2010). The upper reaches of Narragansett Bay and urbanized tidal rivers and embayments have been more heavily impacted by urbanized areas, which has led to continued water quality degradation, including low DO levels from excess nutrient (nitrogen) runoff (Rhode Island Division of Planning 2016). Chlorophyll *a* concentrations in samples from Rhode Island Sound and Block Island Sound were variable but representative of oceanic systems and comparable to each other and other coastal systems (RI CRMC 2010; RPS 2021). In Narragansett Bay, chlorophyll *a* concentrations were slightly higher compared to the overall northeast coast region (RI CRMC 2010; vhb 2022).

Pathogens and nutrients, which are transported from point and nonpoint sources of pollution to coastal waters through stormwater and wastewater discharges (RI CRMC 2016), are the most prevalent pollutants degrading water quality in Rhode Island (Rhode Island Division of Planning 2016). There have been no documented reports of harmful algal blooms or waterborne pathogen outbreaks in the Block Island Sound or Rhode Island Sound (EPA 2012; RI CRMC 2010); however, excess nutrients (nitrogen) in Narragansett Bay have led to oxygen depletion events (hypoxia and anoxia) that have degraded water quality conditions (EPA 2012; Rhode Island Division of Planning 2016). Dissolved nutrients from Narragansett Bay, in addition to those from Long Island Sound, reach OCS waters and contribute to degraded water quality conditions (vhb 2022). Nutrient levels in Rhode Island waters have decreased over the past 15 years (RI CRMC 2016; vhb 2022), and Rhode Island's southern shoreline waters have overall remained acceptable for both swimming and shellfishing (Rhode Island Division of Planning 2016). Dissolved inorganic phosphorus (a form of phosphorus in fertilizers) concentrations at monitoring stations in the Long Island Sound and Narragansett Bay were rated as "poor" (0.05–0.20 milligram per liter) (EPA 2012).

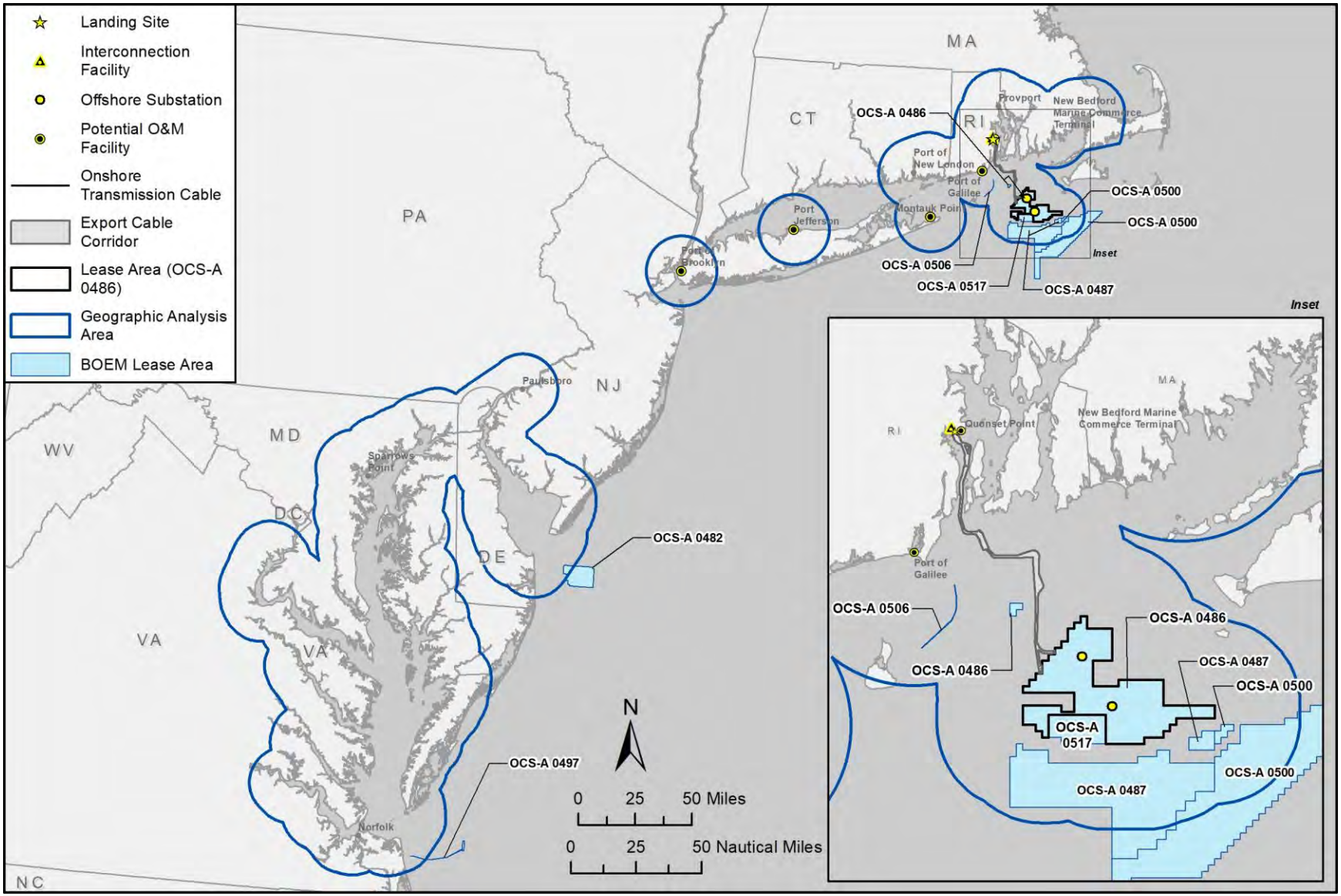

Figure 3.21-1. Geographic analysis area for offshore water quality.

Data are limited for water-column contaminant levels. In the Rhode Island Sound, organic contaminants were below detectable limits (USACE 2004; vhb 2022). Higher concentrations of heavy metals and PCBs have been identified in the northern reaches of Narragansett Bay compared to lower reaches (vhb 2022). Past investigations in and around the analysis area have not identified metal, PCB, or organic and inorganic pollutant concentrations above ambient water quality criteria (RI CRMC 2010). Contaminants could also reside within the sediment column and contribute to water quality conditions if disturbed. The Narragansett Bay is rated as "poor" for sediment toxicity (EPA 2012).

Turbidity is influenced by currents and storms, which lead to the resuspension of clay, silt, and fine-grained sand that comprise the sediment. Federal marine waters typically have very low concentrations of total suspended solids. Past investigations in the Rhode Island Sound revealed a range of turbidity levels from 0.1 to 7.4 milligram per liter of total suspended solids (USACE 2004; vhb 2022). Within the Narragansett Bay, annual average visibility depth in 2017–2019 ranged from 1.7 to 2.3 meters. See COP Section 4.2 (vhb 2022) for additional information regarding physical oceanographic and meteorological conditions within the analysis area.

3.21.1.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential offshore water quality impacts associated with future offshore wind development. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: Future offshore wind activities could contribute to changes in offshore water quality from a spill or release during routine vessel or equipment use, a spill at an offshore wind facility, a spill during construction and installation due to a vessel allision or collision, or the accidental discharge of trash and debris.

Numerous offshore wind projects could occur with overlapping construction schedules between 2022 and 2032 (see Appendix E). This EIS estimates that up to approximately 1.8 million gallons of coolants, fuels, oils, and lubricants could be stored within WTG foundations and the OSS within the offshore water quality GAA. Other chemicals, including grease, paints, and sulfur hexafluoride, would also be used at the offshore wind projects. BOEM anticipates that the likelihood of a major spill of these chemicals during construction due to vessel allisions, collisions, O&M activities, or weather events is very low (once per 1,000 years) (Bejarano et al. 2013). All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and BSEE. OSRPs are required for each project and would provide for rapid spill response, cleanup, and other measures that would help to minimize potential impacts on affected resources from spills. WTGs and OSSs are generally self-contained and would not generate discharge (see COP Appendix D). Vessels would also have onboard containment measures that would further reduce the impact of a spill in the event of an allision or collision.

A release during construction or operations of offshore wind projects would generally be classified as "routine" and minor adverse because of the size of the release (i.e., spills less than 10 barrels, or 420 gallons) and its rapid dispersion (BOEM 2015). Routine spills would result in little change to water quality and would therefore be localized, short term, and **minor** adverse. In the unlikely event an allision or collision involving Project vessels or components resulted in a large spill, impacts on water quality would be **minor** to **moderate** adverse, and would range from short term to long term, depending on the

type and volume of material released, the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill, and effectiveness of the cleanup techniques deployed.

Vessel operators would be required to comply with federal and international requirements for the management of shipboard trash and the USCG ballast water management requirements outlined in 33 CFR 151 and 46 CFR 162. Accidental releases of trash and debris would be infrequent and **negligible** adverse, and any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids.

Anchoring and new cable emplacement/maintenance: Offshore wind activities would contribute to changes in offshore water quality from resuspension and deposition of sediments during anchoring. BOEM estimates that approximately 698 acres of seafloor could be impacted by anchoring under the No Action Alternative within the offshore water quality GAA. Disturbances to the seafloor during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. Currents and storms currently contribute to turbidity throughout the water column from the resuspension of clay, silt, and fine-grained sand making up the sediment. As a result, adverse impacts on offshore water quality under the No Action Alternative would be **minor** adverse and temporary.

BOEM estimates that approximately 3,134 acres of seafloor could be impacted by cable placement under the No Action Alternative within the offshore water quality GAA due to reasonably foreseeable offshore wind development. Similar to anchoring, these activities would contribute to changes in offshore water quality from the resuspension and deposition of sediment. Sediment suspension and deposition from offshore wind projects would be limited in terms of extent and duration.

BOEM anticipates that future offshore wind projects would use dredging only when necessary and would rely on other cable laying methods for reduced impacts (such as jet plow or mechanical plow) where feasible. Furthermore, these impacts from individual projects would not be expected to overlap with one another spatially or temporally. For these reasons, sediment suspension associated with other wind projects would be localized, **minor** adverse, and temporary.

Port utilization: Offshore wind development would use nearby ports as described in Chapter 2 and could also require port expansion or modification, resulting in increased vessel traffic or increased suspension and turbidity from in-water work. These activities could also increase the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the No Action Alternative would be short term to long term **minor** adverse.

Presence of structures: Reasonably foreseeable offshore wind projects are estimated to result in no more than 205 structures by 2030 within the offshore water quality GAA. These structures could disturb up to 201 acres of seafloor within the water quality GAA from foundation and scour protection installation and disrupt bottom current patterns, leading to increased movement, suspension, and deposition of sediments. Scouring, which could lead to impacts on water quality through the formation of sediment plumes (Harris et al. 2011), would generally occur in shallow areas with tidally dominated currents. Structures could reduce wind-forced mixing of surface waters, whereas water flowing around the foundations could increase vertical mixing (Carpenter et al. 2016; Cazenave et al. 2016). Results from a recent BOEM (2021b) hydrodynamic model of four different WTG build-out scenarios of the offshore RI/MA WEA found that

offshore wind projects could alter local and regional physical oceanic processes (e.g., currents, temperature stratification) through their influence on currents from WTG foundations and by extracting energy from the wind. The results of the hydrodynamic model study show that the introduction of offshore wind structures into the offshore area modifies the oceanic responses of current magnitude, temperature, and wave heights by 1) reducing the current magnitude through added flow resistance, 2) influencing the temperature stratification by introducing additional mixing, and 3) reducing current magnitude and wave height by extracting of energy from the wind by the OSW turbines. Alterations in currents and mixing would affect water quality, including DO, but would vary seasonally and regionally. WTGs and OSSs associated with reasonably foreseeable offshore wind projects would be placed in average water depths of 100 to 200 feet where current speeds are relatively low, and offshore cables would be buried where possible. Cable armoring would be used where burial is not possible, such as in hard-bottomed areas. BOEM anticipates that developers would implement best management practices to minimize seafloor disturbance from foundations, scour, and cable installation. As a result, impacts on offshore water quality under the No Action Alternative would be localized, short term, and **minor** adverse.

The exposure of offshore wind structures, which are mainly made of steel, to the marine environment can result in corrosion to the structures without protective measures. Corrosion is a general problem for offshore infrastructures, and corrosion protection systems are necessary to maintain the structural integrity. Protective measures for corrosion (e.g., coatings, cathodic protection systems) are often in direct contact with seawater and have different potentials for emissions, e.g., galvanic anodes emitting metals, such as aluminum, zinc, and indium, and organic coatings releasing organic compounds due to weathering and/or leaching. The current understanding of chemical emissions for offshore wind structures is that emissions appear to be low, suggesting a low environmental impact, especially if compared to other offshore activities, but these emissions may become more relevant for the marine environment with increased numbers of offshore wind projects and a better understanding of the potential long-term effects of corrosion protection systems (Kirchgeorg et al. 2018).

3.21.1.1.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts to offshore water quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on water quality from offshore spills or discharge, resuspension and deposition of sediments, scouring, or changes to current patterns and mixing.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be minor to moderate adverse due to short-term erosion and sedimentation, discharges, and dispersal of contaminants during routine spills. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable offshore activities other than offshore wind would be minor to moderate adverse due to temporary or short-term disturbance to sediments during construction activities.

BOEM anticipates that the impacts associated with future offshore wind activities in the GAA combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small and the resource would recover completely.

3.21.1.2 Onshore Water Quality

Geographic analysis area: The GAA for onshore water quality impacts comprises the watersheds and groundwater basins that cross or fall within the Lease Area (Figure 3.21-2). This analysis area was chosen to capture the extent of the natural network of waterbodies that could be affected by construction and operations activities of the Project.

Affected environment: The onshore analysis area for surface water encompasses the Lower West Passage subwatershed (Hydrologic Unit Code 010900040908), where all Project components would be located (see Figure 3.21-2). The Lower West Passage subwatershed includes more than 500 surface water features (U.S. Geological Survey 2004). The Project's onshore facilities would not cross surface waterbodies. The nearest surface water features to the Lease Area that would contribute to flows to and from the Lease Area include 10 perennial streams/rivers, three artificial paths, 16 swamps/marshes, and 12 perennial lakes/ponds. These waterbodies, which are identified in Figure 3.21-2, would have the greatest influence on or from the Project and are therefore the focus of this analysis of onshore water quality impacts.

Surface water quality within the onshore water quality analysis area is generally good. None of the surface waterbodies near the Lease Area are currently listed as impaired (Rhode Island DEM 2021a). There is only one named waterbody—Mill Creek—near the Lease Area. Mill Creek, including its tributaries, is designated as Class B (Rhode Island DEM 2021b), which includes waters that are designated for fish and wildlife habitat and primary and secondary contact recreational activities (250 RICR 150.05 (Rhode Island Department of State 2018).

Groundwater resources are limited in the analysis area. The Project would be located (at its closest point) approximately 0.1 mile west of the Conanicut Island Aquifer, which is a sole source aquifer (URI Environmental Data Center and Rhode Island GIS 2016a). At its nearest points, the Project would be located approximately 1.2 miles east of the nearest groundwater recharge area and 2 miles east of the Pettaquamscutt groundwater reservoir, which is classified as a Class GAA groundwater (URI Environmental Data Center and Rhode Island GIS 2016b, 2016c). Class GAA groundwaters are known or presumed suitable for drinking water use without treatment and fall within a water supply priority for the area (Rhode Island DEM 2009).

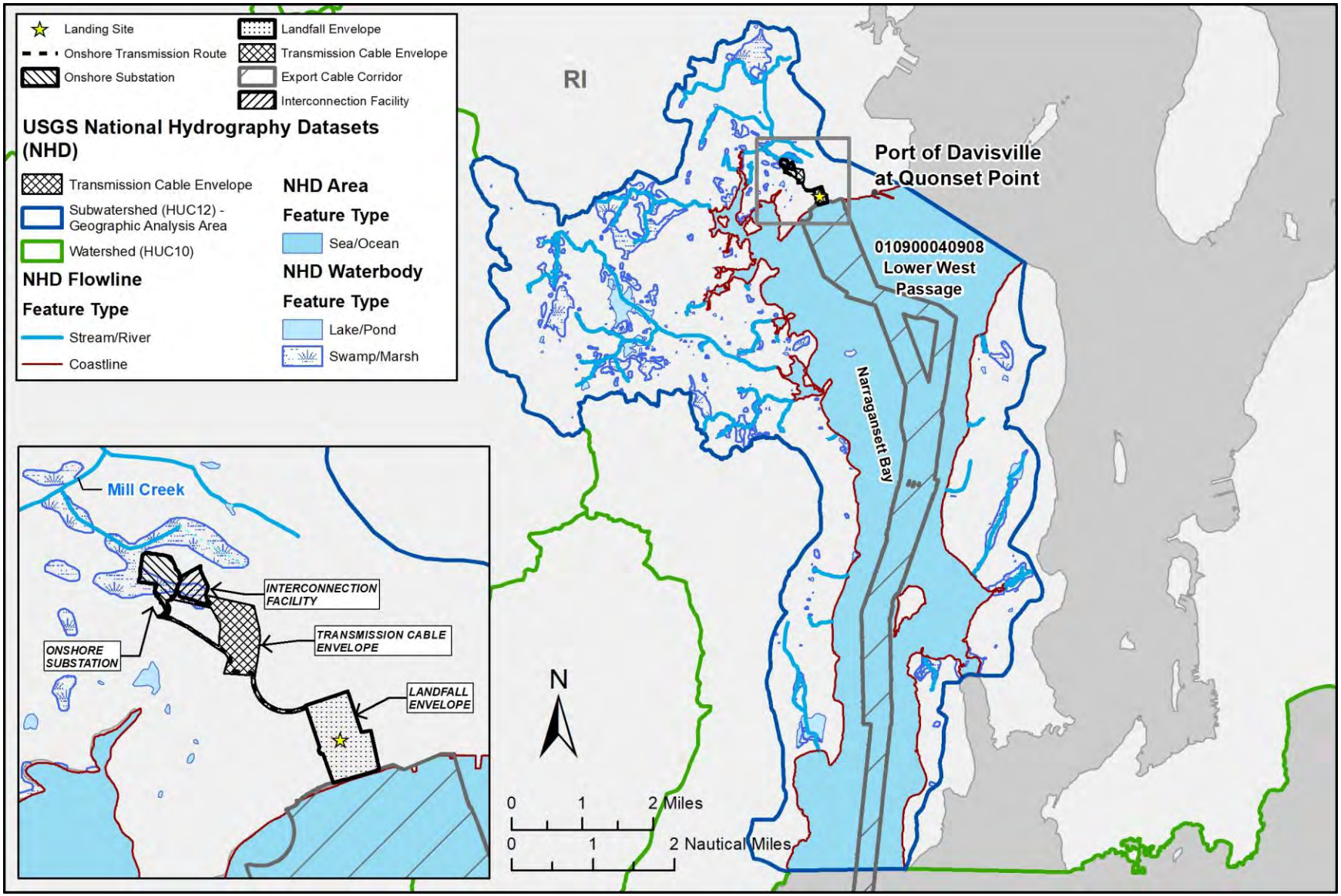

Figure 3.21-2. Geographic analysis area for onshore water quality.

There are 12 hazardous waste generating facilities near the Project (EPA 2021a). One of these facilities, the Senesco Marine Repair Yard, is approximately 0.7 mile from the eastern edge of the Project and 0.5 mile from the northeast corner of the cable corridor. The Senesco Marine Repair Yard has a current CWA violation within the past 12 months due to a violation of their NPDES permit (EPA 2021b). There is one hazardous waste cleanup site (EPA ID#: RID063900690) that includes the landfall work area (EPA 2021c). The waste storage container areas and tanks at this site have been "clean closed" in accordance with Resource Conservation and Recovery Act regulations, and there are no current identified violations at the facility (EPA 2021c, 2021d).

3.21.1.2.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential onshore water quality impacts associated with onshore activities directly connected to or supporting future cumulative offshore wind development in the GAA. Analysis of impacts associated with ongoing and future non–offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: Reasonably foreseeable onshore activities supporting OSW could contribute to changes in water quality from accidental releases and discharges, dispersal of contaminants during routine spills, or accidental releases of contaminated or hazardous materials or debris if surface water bodies are intersected. Routine spills that reach surface water would be expected to disperse rapidly (BOEM 2015).

Future onshore activities supporting OSW would be expected to comply with any applicable permit requirements, including spill controls, to minimize, reduce, or avoid impacts on surface water and groundwater quality. Degradations to onshore water quality from future onshore activities are expected to be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05) (Rhode Island Department of State 2018). Surface and groundwater bodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future onshore activities supporting OSW on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse.

New cable emplacement/maintenance: Future onshore activities supporting OSW could result in changes to water quality from cable-related land disturbance, such as surficial digging, land clearing, trenching, HDD, and use of vehicles, that could contribute to erosion and sedimentation. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. Degradations to onshore water quality from future onshore activities are expected to be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05). Waterbodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future activities on onshore water quality under the No Action Alternative would be temporary to long term **negligible** to **minor** adverse.

Port utilization: Future onshore activities supporting OSW are expected to continue to use ports and would likely require expansion or modification of existing onshore port facilities in the analysis area. These port-related activities would include land disturbance.

Future expansion or modification of existing ports in addition to increased use could also increase the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term but **negligible** to **minor** adverse. Port activities would not include surficial digging that could encounter groundwater; as a result, there are no potential impacts on groundwater from port use (Rhode Island Department of State 2018).

Presence of structures: The presences of structures from future onshore activities supporting OSW would result in an increase in impervious surfaces that could contribute to stormwater runoff to nearby waterbodies. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse.

3.21.1.2.2 Conclusions

Under the No Action Alternative, BOEM would not approve the COP; Project construction and installation, O&M, and decommissioning would not occur; and potential impacts on onshore water quality associated with the Project would not occur. However, ongoing and future activities would continue to contribute temporary to long-term impacts on water quality from onshore erosion and sedimentation, or discharges, dispersal of contaminants during routine spills.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities and connected onshore activities would be **negligible** to **minor** adverse due to short-term erosion and sedimentation, discharges, and dispersal of contaminants during accidental and routine spills. As described in Appendix E1, BOEM anticipates that the range of impacts for ongoing and reasonably foreseeable offshore activities other than offshore wind would be **negligible** to **minor** adverse primarily due to temporary or short-term disturbance to sediments during port expansion and other onshore construction and installation activities (e.g., beach and coastal restoration projects). Other reasonably foreseeable non–offshore wind IPFs with potential for routine and/or accidental releases or sediment disturbance are either 1) not expected to overlap with the GAA spatially and temporally or 2) would not be expected to have measurable impacts on the overall water quality in the GAA as discussed in Appendix E1.

BOEM anticipates that the impacts associated with future offshore wind activities in the GAA for onshore water quality combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small and the resource would recover completely without remedial or mitigating action.

3.21.2 Environmental Consequences

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

This assessment analyzes the maximum-case scenario; however, there is the potential for variances in the proposed Project build-out, as defined in the PDE (see Appendix D). The Project design parameters that

would influence the magnitude of the impacts on offshore waters include the number of WTGs and distance of installed IAC. Construction and operations activities for fewer WTGs and a shorter IAC distance could result in similar or lower impacts than described in Section 3.21.2.2. For onshore waters, the Project design parameters that would influence the magnitude of the impacts include the location of and construction of or within the OnSS, ICF, and landfall work area. However, EPMs implemented during both construction and decommissioning, as well as a facility-specific spill plan implemented during O&M, would decrease the potential for impacts to onshore waters. Likewise, the implementation of the Project OSRP would help minimize impacts on offshore water quality from spills. These EPMs would be implemented across all alternatives; therefore, BOEM would not expect measurable potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for water quality across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E1-4 in Appendix E1.

Table 3.21.1 discloses IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action follows the table. Detailed analysis of other considered action alternatives is also provided below the table if the analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4 to facilitate reader comparison across alternatives.

The conclusion section within each alternative analysis discussion includes a rationale for the overall impact determination. The overall impact of any alternative would be **minor** adverse because the effects would be small, and the resource would be expected to recover completely without remedial or mitigating action.

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Table 3.21-1. Alternative Comparison Summary for Water Quality

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Offshore:** Routine spills would result in little change to water quality and would therefore be localized, short term, and **minor** adverse. In the unlikely event an allision or collision involving Project vessels or components resulted in a large spill, impacts on water quality would be **minor** to **moderate** adverse, and would range from short term to long term, depending on the type and volume of material released, the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill, and effectiveness of the cleanup techniques deployed. Vessel operators would be required to comply with federal and international requirements for the management of shipboard trash and the USCG ballast water management requirements outlined in 33 CFR 151 and 46 CFR 162. Accidental releases of trash and debris would be infrequent and **negligible** adverse, and any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids.	**Offshore**: Fuels and oils would be required for Proposed Action offshore equipment, vessels, and infrastructure. The volumes of fuels and oils and number of vessels required during O&M and decommissioning would be less than that required during construction and installation. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. As a result, adverse impacts on water quality would be short term, with spills generally dispersing within days (BOEM 2015), and **minor** to **moderate** adverse, depending on the severity of the spill. In the unlikely event an allision or collision involving Project vessels or components results in a large spill, impacts on water quality would also be **minor** to **moderate** adverse, and short term to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill. Accidental releases of trash and debris would be infrequent and **negligible** adverse because Project actions would comply with federal and international requirements for management of shipboard trash and USCG regulations regarding waste and discharge. The Proposed Action could add accidental releases of fuels, oils, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. BOEM estimates that the Project would result in an up-to-56% increase in total chemical usage over the No Action Alternative within the offshore water quality GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with the USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table F-1 in Appendix F) proposed for waste management and mitigation of marine debris would be required of Revolution Wind Project personnel. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term to long-term **minor** to **moderate** adverse impacts.	**Offshore:** Alternatives C through F would reduce the number of WTG foundations. This would require less fuels and oils associated with equipment, vessels, and infrastructure; less fuels and oils stored at WTGs; and less volumes of associated trash and debris. These alternatives would also likely reduce the number and duration of vessels required during construction and installation, O&M, and decommissioning activities. Under all action alternatives, Project EPMs (see Table F-1 in Appendix F), permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Therefore, impacts under these alternatives would be similar to the Proposed Action: short term to long term **negligible** to **moderate** adverse. Ongoing and planned actions, including those under Alternatives C through F, would require fuels and oils. Any Project-related accidental spills or discharges, including those associated with vessel allisions or collisions, would add to water quality impacts from other planned actions, albeit at potentially slightly lower volumes than the Proposed Action under these alternatives. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term to long-term and **minor** to **moderate** adverse cumulative impacts on water quality.			
	Onshore: Surface and groundwater bodies would be monitored and managed to meet water quality standards and drinking water resource protections. As a result, adverse impacts from future onshore wind activities supporting OSW on onshore water quality under the No Action Alternative would be short term to long term **negligible** to **minor** adverse**.**	**Onshore:** Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, the adverse impact on water quality would be short term **negligible** to **minor** adverse**.**	**Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: short term **negligible** to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Anchoring and new cable emplacement/ maintenance	**Offshore:** Disturbances to the seafloor during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. BOEM anticipates that future offshore wind projects would use dredging only when necessary and would rely on other cable-laying methods for reduced impacts (such as jet plow or mechanical plow) where feasible. Furthermore, these impacts from individual projects would not overlap with one another spatially or temporally. As a result, adverse impacts on offshore water quality under the No Action Alternative would be **minor** adverse and temporary.	**Offshore**: Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality from anchoring, potential in situ munitions and explosives of concern (MEC)/UXO disposal, and cable placement activities under the Proposed Action would be **minor** adverse and temporary. BOEM estimates a cumulative total of 7,143 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects and 3,876 acres of anchoring-related disturbance for the Proposed Action plus all other future offshore wind projects. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability typical for the affected area. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term **mino**r adverse cumulative impacts to water quality.	**Offshore:** Alternatives C through F would reduce the number of WTGs and scour protections associated with IACs. This would require fewer seafloor disturbances during construction and installation, O&M and decommissioning; however, the types and extent of seafloor disturbances would be similar, and the impacts on water quality would be comparable. As a result, impacts to water quality under the Habitat Alternative would be similar to the Proposed Action: **minor** adverse and temporary. Total anchoring and cabling seafloor disturbance that could occur from ongoing and planned actions, including those actions under Alternatives C through F, would be similar but slightly reduced from the Proposed Action. Project-related seafloor disturbances would add to water quality impacts. Therefore, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in short-term and **minor** adverse cumulative impacts on water quality.			
	Onshore: Degradations to onshore water quality from future onshore activities would be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet Rhode Island water quality standards (250 RICR 150.05). As a result, adverse impacts from future activities on onshore water quality under the No Action Alternative would be temporary to long term **negligible** to **minor** adverse**.**	**Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore water quality under the Proposed Action would be short term **negligible** to **minor** adverse.	**Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: short term **negligible** to **minor** adverse.			
Port utilization	**Offshore:** Port activities could increase vessel traffic, suspension and turbidity from in-water work, and the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the No Action Alternative would be short term to long term **minor** adverse.	**Offshore:** Port-related actions would be localized, and port activities would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse. Cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse.	**Offshore:** The types and extent of port activities under Alternatives C through F would be the same as described for the Proposed Action. Therefore, impacts would be short to long term but **minor** adverse. Cumulative impacts associated with Alternatives C through F and past, present, and reasonably foreseeable future activities would be the same as described for the Proposed Action: **negligible** to **minor** adverse.			
	Onshore: Future expansion or modification of existing ports in addition to increased use could increase land disturbance and the risk of accidental spills or discharges. However, these actions would be localized, and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term but **negligible** to **minor** adverse.	**Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary to short term **negligible** to **minor** adverse.	**Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: temporary to short term **negligible** to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) Up to 100 WTGs	Alternative C (Habitat Alternative) 64 or 65 WTGs	Alternative D (Transit Alternative) 78 to 93 WTGs	Alternative E (Viewshed Alternative) 64 or 81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	**Offshore:** Structures could disturb seafloor within the water quality GAA from foundation and scour protection installation and disrupt bottom current patterns, leading to increased movement, suspension, and deposition of sediments. BOEM anticipates that developers would implement best management practices to minimize seafloor disturbance from foundations, scour, and cable installation. As a result, impacts on offshore water quality under the No Action Alternative would be localized, short term, and **minor** adverse.	**Offshore:** BOEM estimates that the Project would result in an up-to-50% increase in total structures over the No Action Alternative within the offshore water quality GAA. EPMs in Table F-1 in Appendix F would be implemented to minimize seafloor disturbance from foundations and scour. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **minor** adverse. Because of the limited extent of impacts and BOEM's expectation that Revolution Wind and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would also result in **minor** adverse and long-term impacts to water quality.	**Offshore:** Alternatives C through F would reduce the number of WTGs and scour protection associated with foundations. This would require fewer acres of seafloor disturbance during construction and installation, O&M, and decommissioning that could disrupt bottom current patterns and lead to scouring; however, the types of seafloor disturbance and changes to patterns and flows would be similar. For comparison, Alternatives C and E would reduce seafloor disturbance by up to 35%, Alternative D would reduce seafloor disturbance by up to 21.5%, and Alternative F would reduce seafloor disturbance by up to 43%, as compared to the maximum-case scenario for the Proposed Action. Implementation of Alternative F in conjunction with Alternatives C, D, and E would further reduce seafloor disturbance for these alternatives by up to 8%, 21.5%, and 8%, respectively. As a result, impacts to offshore water quality under Alternatives C through F would be similar to the Proposed Action: short term **minor** adverse. See Table E-4 in Appendix E for foundation construction footprint calculations per alternative. Alternatives C through F would result in an up-to-27 to 45% increase in structures from the No Action Alternative. New structures related to Alternatives C through F would add to seafloor disturbances and disruptions to bottom current patterns that would lead to scouring and associated water quality impacts. However, for similar reasons as the Proposed Action, Alternatives C through F when combined with past, present, and reasonably foreseeable activities would result in long-term and **minor** adverse cumulative impacts on water quality.			
	Onshore: The presences of structures from future onshore activities supporting OSW would result in an increase in impervious surfaces that could contribute to stormwater runoff to nearby waterbodies. These activities would be expected to comply with any applicable permit requirements to implement erosion and stormwater controls to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on onshore water quality under the No Action Alternative would be short to long term **negligible** to **minor** adverse**.**	**Onshore:** The implementation of EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse.	**Onshore:** Alternatives C through F would not change Project onshore activities; therefore, impacts would remain the same as the Proposed Action: short term **negligible** to **minor** adverse.			

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3.21.2.2 Alternative B: Impacts of the Proposed Action on Water Quality

3.21.2.2.1 Construction and Installation

Offshore Activities and Facilities

Accidental releases and discharges: Fuels and oils would be required for Proposed Action offshore construction and installation equipment, vessels, and infrastructure over the 18-month construction and installation period. In the event of a spill or release during construction and installation activities, offshore water quality would be degraded. Most inadvertent spills of fuels and oils used during construction and installation would be classified as routine and minor adverse because of their size (i.e., spills less than 10 barrels, or 420 gallons) and rapid dispersion (BOEM 2015). As described in Section 3.21.1.2, the likelihood of a spill due to construction and installation activities and weather events is low (once per 1,000 years). A draft OSRP has been prepared for the Project and includes processes for rapid spill response, containment, cleanup, and other measures that would help minimize impacts on water quality from spills (see COP Appendix D).

Fuels and oils would be used and stored at WTGs and OSSs. A maximum of approximately 7,530 gallons of coolants, fuels, oils and lubricants would be stored at each WTG (or a total of approximately 753,000 gallons for the maximum 100 proposed WTGs), and a maximum of 132,400 gallons of fuels, oils, and lubricants would be stored at each OSS (or a total of approximately 264,800 gallons for the two proposed OSSs). Secondary containment measures would be implemented for all diesel tanks at WTGs (vhb 2022). Under the Proposed Action, the highest possible spill would be the inadvertent release of fuels and oils stored at WTGs and OSSs, which would contain up to 1,018,000 gallons of fuels and oils. Project EPMs (see Table F-1 in Appendix F), permit requirements, controls, and procedures would be implemented as part of the Project to reduce the potential or extent of offshore spills, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. As a result, adverse impacts on water quality would be short term, with spills generally dispersing within days (BOEM 2015), and **minor** to **moderate** adverse, depending on the severity of the spill.

Construction of the Proposed Action would require as many as 61 vessels. Vessels would be equipped with spill containment and cleanup materials, and any accidental spill or release of fuels, oils, or other hazardous materials would be managed through the Project's OSRP (vhb 2022). All construction-related vessels would be required to comply with regulatory requirements related to the prevention and control of spills and discharges (vhb 2022). The chance of a spill occurring due to vessel allisions or collisions would be low (once per 1,000 years). In the unlikely event an allision or collision involving Project vessels or components results in a large spill, impacts on water quality would be **minor** to **moderate** adverse, and short term to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill.

The Proposed Action could also result in accidental releases of trash and debris from vessels or in situ MEC/UXO disposal into offshore waters. EPMs in Table F-1 in Appendix F would be implemented to avoid or minimize impacts on water quality from releases of trash or debris. Accidental releases of trash and debris would be infrequent and **negligible** adverse because vessels would comply with federal and international requirements for management of shipboard trash and USCG regulations regarding waste and

discharge. Foreign-flagged vessels would also have a USCG-compliant and certified ballast water management system. Any allowed vessel discharges, such as bilge and ballast water, would be restricted to uncontaminated or appropriately treated liquids. Should an accidental release occur, it would be limited to the localized area; adverse impacts on water quality would be short term **minor** to **moderate** adverse.

Existing restoration and protection initiatives established for offshore areas, including those developed as part of the Long Island Sound Study initiative (Long Island Sound Study 2021), Bay Assessment & Response Team (Rhode Island DEM 2021c), Rhode Island Beach Monitoring Program (Rhode Island Department of Health 2021), and Rhode Island Environmental Monitoring Collaborative (RIEMC 2021), would help identify and manage water quality degradations, should they occur.

Anchoring and new cable emplacement/maintenance: Approximately 3,178 acres and 4,009 acres of seafloor could be impacted by anchoring and cable placement, respectively, under the Proposed Action within the offshore water quality GAA. Potential in situ MEC/UXO disposal could also result in sediment suspension and disturbance. Disturbances to the seafloor would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage, disposal, or cable placement area. Sediment modeling completed for the Proposed Action indicates that sediment suspension and deposition would occur during in-water offshore activities (RPS 2022). The modeling showed that in most locations the total suspended solids plumes are limited to the bottom 10 feet of the water column and are temporary at any given location. Suspended sediments would settle within hours or days, including up to 6.7 hours in the RWF IAC, 61 hours in the RWEC-OCS, approximately 70 hours along the RWEC-RI, and 70 hours at the landing site where HDD would occur.

EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality from anchoring and cable placement activities under the Proposed Action would be **minor** adverse and temporary.

Port utilization: The Project would use nearby ports for a construction hub, for WTG storage and pre-commissioning, and for foundation marshalling and fabrication. These activities would result in increased vessel traffic and increased in-water activities, which would contribute to increased suspension and turbidity. As many as 61 vessels would be required during construction and installation. These activities could also increase the risk of accidental spills or discharges. Port-related actions would be localized, and port activities would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. In addition, EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse.

It is not known at this time if port expansions or modifications would be required for the Proposed Action (vhb 2022). If so, these activities would require in-water work, including vessel use, that would increase sediment suspension and turbidity. Impacts from these activities would be similar to those described above for port uses.

Presence of structures: The Proposed Action would result in up to 100 monopile foundations for WTGs and two monopile foundations for OSSs within the GAA for offshore water quality. These structures could temporarily disturb up to approximately 720 acres (7.2 acre per foundation) during seafloor

preparation. Foundations would encompass a total footprint of approximately 71 acres (0.7 acre per foundation) of seafloor disturbance and scour protection. Seafloor disturbance would occur from foundation and scour protection installation, and the presence of structures would disrupt bottom current patterns and lead to increased movement, suspension, and deposition of sediments. Project-related scouring could impact water quality through the formation of sediment plumes, and structures could reduce wind-forced mixing of surface waters. Flows around foundations could increase vertical mixing of the water column. These changes in currents and mixing would affect water quality but would vary seasonally and regionally. EPMs in Table F-1 in Appendix F would be implemented to minimize seafloor disturbance from foundations and scour, including the installation of scour protection and cable armoring where burial is not possible, that would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on offshore water quality under the Proposed Action would be localized, short term, and **minor** adverse.

Onshore Activities and Facilities

Accidental releases and discharges: Onshore facilities would not cross surface waterbodies. Onshore construction equipment, vehicles, and infrastructure under the Proposed Action would require fuels and oils during the construction and installation period. Although unlikely due to distance to closest stream of 200 feet, any inadvertent spills occurring during construction and installation, such as the release of fuels and oils from vehicles or infrastructure, would be classified as routine and minor adverse (BOEM 2015).

Table F-1 in Appendix F includes EPMs to avoid or minimize potential spill impacts on water quality, to comply with all general construction permit requirements, and to implement runoff controls and buffers. In addition, Revolution Wind would develop and implement a stormwater pollution prevention plan and HDD inadvertent release plan to protect nearby surface waters. Although these procedures would reduce the likelihood and extent of routine spills, spills in or near surface waterbodies would contribute to detectable changes that could result in an exceedance of water quality standards. Therefore, the adverse impact on water quality would be short term **minor** adverse.

There are no groundwater resources crossed by the Project. As described in Section 3.21.1.3, the nearest groundwater recharge area would be approximately 1.2 miles from the Project. At this distance, the risk of any inadvertent spill or release to groundwater during construction and installation of the Project would be **negligible** adverse.

New cable emplacement/maintenance: The Project would require the installation of permanent (over the life of the Project) onshore export cable (i.e., the RWEC). This activity would require temporary (up to 18 months) ground-disturbing activities including surficial digging, land clearing, trenching, HDD, and use of equipment and vehicles. The RWEC route does not directly intersect any surface waterbody; however, surface disturbance associated with installation could contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes in water quality. Overall construction activities and Project infrastructure would disturb more than 1 acre, and discharges would therefore need to be permitted through a general construction permit under the NPDES program. Revolution Wind would also develop a stormwater pollution prevention plan as part of the permitting process that would result in implementation of erosion and sediment controls prior to and during construction and installation. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind

would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse.

The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in **negligible** adverse risks of a spill or release reaching groundwater resources.

Port utilization: The Project would use nearby ports to support construction and installation of the Proposed Action. Increased use and related activities at ports could increase the risk of accidental spills or discharge to nearby surface waterbodies. Inadvertent spills or releases during construction and installation would be classified as routine and would be localized, short term, and minor adverse. It is not known at this time if port expansions or modifications would be required. If so, these activities would require surface disturbances that would contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes to water quality.

EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary and **negligible** to **minor** adverse. No impacts on groundwater are anticipated from port use during onshore construction and installation because there would be no required surface disturbance that could encounter groundwater or result in water quality degradations through runoff into groundwater recharge areas.

Presence of structures: The presence of structures from the Proposed Action would result in an increase in impervious surfaces (20 acres) that could contribute to stormwater runoff to nearby surface waterbodies. The OSS would encompass approximately 16 acres, and the onshore ICF would temporarily encompass approximately 4 acres. Fill materials would be used for installation of structures. None of the onshore facilities of the RWEC route directly intersect any surface waterbody; however, surface disturbance associated with installation of onshore facilities could contribute to erosion and sedimentation in nearby surface waterbodies, thereby leading to changes in water quality. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As described under the new cable emplacement/maintenance IPF, discharges would be permitted through a general construction permit under the NPDES program. Revolution Wind would also develop a stormwater pollution prevention plan as part of the permitting process that would result in implementation of erosion and sediment controls prior to and during construction and installation. As a result, impacts on onshore water quality under the Proposed Action would be localized, short term, and **negligible** to **minor** adverse. The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in minimal risk of runoff reaching groundwater resources; **negligible** adverse impacts on groundwater are anticipated from the presence of structures during onshore construction and installation.

3.21.2.2.2 Operations and Maintenance and Decommissioning

Offshore Activities and Facilities

Accidental releases and discharges: O&M and decommissioning of the offshore portion of the Project would lead to similar adverse impacts on water quality from inadvertent spills or releases that could occur during construction and installation. The volumes of fuels and oils and number of vessels required during

O&M and decommissioning would be less than that required during construction and installation (vhb 2022). The same Project features and EPMs described for offshore construction and installation (see Section 3.21.2.2.1) would be implemented during O&M and decommissioning to avoid or minimize potential spill impacts on water quality. Most inadvertent spills of fuels and oils used during O&M and decommissioning would be classified as routine and minor adverse. Should a routine spill occur, it would be temporarily detectable and would disperse rapidly, thereby limiting the magnitude and extent of changes to water quality. Therefore, changes to water quality would be localized, short term, and **minor to moderate** adverse, depending on the severity of potential spills or releases.

Anchoring and new cable emplacement/maintenance: Anchoring and cable-related activities during O&M and decommissioning would contribute to changes in offshore water quality from the resuspension and deposition of sediment. O&M and decommissioning of the offshore portion of the Project would lead to similar minor adverse and temporary adverse impacts on water quality from anchoring and new cable emplacement and maintenance that would occur during construction and installation. Fewer anchoring activities would occur during O&M and decommissioning activities compared to construction and installation. Cable activities would also be less frequent during O&M and decommissioning and would typically include maintenance activities that would result in less seafloor disturbance than installation activities during construction and installation. EPMs in Table F-1 in Appendix F would avoid or minimize impacts on water quality, and Revolution Wind would comply with all permit and regulatory requirements related to water quality. As described for construction and installation (see Section 3.21.2.2.1), suspended sediments would typically settle within hours or days, and the extent of deposition would be limited. Changes to water quality from anchoring and cable activities would be detectable but would not result in degradation of water quality that would exceed water quality standards. As a result, adverse impacts on offshore water quality under the Proposed Action would be **minor** adverse and temporary.

Port utilization: The Project would use nearby ports to support O&M and decommissioning of the Project. As described under offshore construction and installation, these activities would result in increased vessel traffic and increased in-water activities, which would contribute to increased suspension and turbidity. Up to 16 vessels would be required during O&M and decommissioning. These activities could also increase the risk of accidental spills or discharges. See offshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short to long term but **minor** adverse.

Presence of structures: O&M would not result in additional structures that would lead to impacts on water quality. During decommissioning, structures would be removed to a depth of 15 feet below the seafloor (vhb 2022), which would reduce in-water structures that have disrupted bottom current patterns and led to scouring (as described for construction and installation). Water quality during O&M would remain the same, whereas water quality during decommissioning could result in short-term changes to water quality; however, these changes would be limited in terms of duration and extent (similar to those described for construction and installation of structures). See offshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **minor** adverse.

Onshore Activities and Facilities

Accidental releases and discharges: O&M activities would require vehicles and equipment that require the use of fuels, oils, and lubricants. The volumes of fuels and oils and number of vehicles required during O&M and decommissioning would be less than that required during construction and operations (vhb 2022). Although unlikely due to distance to closest surface waterbody of 200 feet, any inadvertent spills in onshore waters during O&M or decommissioning would be classified as routine and **minor** adverse (BOEM 2015). See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be short term **minor** adverse. Similar to onshore construction and installation, O&M and decommissioning activities would be distanced far enough from groundwater recharge areas (at least 1.2 miles) that the risk of a spill or release reaching groundwater resources would be **negligible** adverse.

New cable emplacement/maintenance: O&M would require limited land disturbance should maintenance be required for underground infrastructure (i.e., transmission cable). Decommissioning of the onshore portion of the Project would lead to the same types of impacts on surface water quality from erosion, sedimentation as described under construction and installation. See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be temporary and **negligible** to **minor** adverse.

The distance between Project-related land-disturbing activities and the nearest groundwater recharge area (1.2 miles) would result in limited risks of a spill or release reaching groundwater resources; **negligible** adverse impacts on groundwater are anticipated from land disturbance during onshore O&M and decommissioning.

Port utilization: The Project would use nearby ports to support O&M and decommissioning of the Project. As described for onshore construction and installation, increased use and related activities at ports could increase the risk of accidental spills or discharge to nearby surface waterbodies. See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on onshore surface water quality under the Proposed Action would be temporary and **minor** adverse. **Negligible** adverse impacts on groundwater are anticipated from port use during onshore construction and installation because there would be no required surface disturbance that could encounter groundwater or result in water quality degradations through runoff into groundwater recharge areas.

Presence of structures: O&M would not result in additional structures that would lead to impacts on water quality. During decommissioning, structures would be removed in compliance with applicable laws and regulations at that time (vhb 2022). Water quality during O&M and decommissioning would remain the same, whereas water quality during decommissioning could result in short-term changes to water quality; however, these changes would be limited in terms of duration and extent (similar to those described for construction and installation of structures). See onshore activities and facilities analysis in Section 3.21.2.2.1 for details. As a result, adverse impacts on offshore water quality under the Proposed Action would be short term **negligible** to **minor** adverse.

3.21.2.2.3 Cumulative Impacts

Offshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could noticeably add accidental releases of fuels, oils, or hazardous material; sediment; and/or trash and debris to conditions under the No Action Alternative. BOEM estimates that the Project would result in an up-to-56% increase in total chemical usage over the No Action Alternative within the offshore water quality GAA. This risk would be increased primarily during construction and installation, O&M, and decommissioning. When the Project is combined with other offshore wind projects, up to approximately 2.8 million gallons of coolants, fuels, oils, and lubricants could cumulatively be stored within WTG foundations and the OSS within the offshore water quality GAA. All vessels associated with the Proposed Action and other offshore wind projects would comply with the USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table F-1 in Appendix F) proposed for waste management and mitigation of marine debris would be required of Revolution Wind Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. For this reason, the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short-term to long-term **minor** to **moderate** adverse impacts.

Anchoring and new cable emplacement/maintenance: The Proposed Action would result in localized, temporary, and minor incremental impacts to water quality through an estimated 3,178 acres of anchoring and mooring-related disturbance. The Proposed Action would add to the estimated 698 acres of seafloor that could be impacted by anchoring from other reasonably foreseeable offshore wind activities. This would result in a cumulative total of 3,876 acres of anchoring-related disturbance for the Proposed Action, plus all other future offshore wind projects. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse cumulative impacts to water quality.

The Proposed Action would result in localized, short-term, and minor adverse impacts to water quality through an estimated 4,009 acres of seafloor disturbance from cable installation, which would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to anchorage areas. This would result in additional turbidity effects, increasing seafloor disturbance due to cable installation, when compared to the No Action Alternative. BOEM estimates a cumulative total of 7,143 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects. Sediment modeling for the Proposed Action indicates that sediment suspension and deposition would occur within an area of up to 328 feet and would settle shortly (hours to days) after the release of sediment (Vinhateiro et al. 2018). Suspended sediment concentrations during activities other than dredging would be within the range of natural variability typical for the affected area. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse cumulative impacts to water quality.

Port utilization: BOEM expects impacts to water quality due to the increase in port use resulting from the Proposed Action to be negligible to minor adverse. Other offshore wind development would use nearby ports and could also require port expansion or modification. However, Revolution Wind and all other developers would comply with all permit requirements to avoid or minimize water quality impacts. Therefore, cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable future activities would be **negligible** to **minor** adverse.

Presence of structures: The Proposed Action would result in long-term and minor adverse impacts to water quality through the installation of 102 structures (100 WTGs and two OSSs). This represents a 50% increase over total estimated WTG and OSS foundations under the No Action Alternative within the offshore water quality GAA. BOEM estimates a cumulative total of 307 structures for the Proposed Action plus all other future offshore wind projects within the offshore water quality GAA. These additional structures could cumulatively add to other offshore impacts to water quality from turbidity due to scour and water current alteration. However, because of the limited extent of impacts and BOEM's expectation that Revolution Wind and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **minor** adverse and long-term impacts to water quality.

Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action would result in negligible to minor adverse onshore water quality impacts on surface water due to discharges and due to dispersal of contaminants during routine spills or inadvertent releases. State and local agencies would be responsible for minimizing and avoiding water quality and other impacts during construction and installation. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore water quality.

New cable emplacement/maintenance: The Proposed Action would result in negligible to minor adverse impacts to onshore water quality impacts on surface water and groundwater due to erosion and sedimentation. State and local agencies would be responsible for minimizing and avoiding water quality and other impacts during construction and installation. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, stormwater, and spill controls to minimize, reduce, or avoid impacts on water quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore water quality.

Port utilization: The Proposed Action would result in minor adverse impacts to onshore water quality due to changes in surface water quality from increased port-related traffic. The Proposed Action would also add to the increased the risk of accidental spills or discharges. Other offshore wind development would also use nearby ports. Revolution Wind and all other developers would comply with all permit requirements to avoid or minimize water quality impacts. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term impacts and **negligible** to **minor** adverse cumulative impacts on onshore surface water quality. The Proposed Action would not contribute to impacts on groundwater quality.

Presence of structures: The Proposed Action would result in temporary and minor adverse impacts to water quality related to the presence of structures, which would also result in an increase in impervious surfaces (19 acres) through the development of 20 acres for the OnSS and ICF. Other offshore wind development would also include the construction and installation of structures and associated impacts to

onshore water quality. These additional structures could cumulatively add to other onshore impacts to water quality from turbidity due to scour and water current alteration. However, because of the limited extent of impacts and BOEM's expectation that Revolution Wind and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in **negligible** to **minor** adverse short-term impacts to water quality.

3.21.2.2.4 Conclusions

Although Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, onshore facilities would not cross surface waterbodies. Therefore, impacts to water quality from potential erosion, sedimentation, or inadvertent release of contamination or hazardous materials or debris into onshore surface waters are not anticipated and would be short term **negligible** to **minor** adverse. Offshore, Project construction and installation and decommissioning would contribute to increased movement, suspension, and deposition of sediments; changes to water column stratification; and mixing patterns that would affect water quality parameters. Impacts from Project O&M would be much lower than those produced during construction and installation and decommissioning but could also result in erosion, sediment resuspension, deposition, and inadvertent spills. BOEM anticipates that the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate** adverse. Therefore, BOEM expects the overall impact on water quality from the Proposed Action alone to be **minor** adverse because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action. The Proposed Action would not result in any net beneficial change to water quality.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to water quality because the effect would be small and the resource would be expected to recover completely. The Proposed Action would not result in benefits to water quality.

3.21.2.3 Alternatives C, D, E, and F

Table 3.21.1 discloses IPF findings for each alternative.

3.21.2.3.1 Conclusions

Although Alternatives C through F would reduce the number of WTGs and their associated IACs offshore, which would have an associated reduction in potential changes to movement, suspension, and deposition of sediments; water column stratification; and mixing patterns, BOEM expects that the impacts resulting from each alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate** adverse. Alternatives C through F would not result in any change to onshore water quality as compared to the Proposed Action and would not result in any net beneficial change to water quality.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that Alternatives C through F's impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse). The overall impacts of each alternative when combined with past, present, and reasonably foreseeable activities would be the same

level as under the Proposed Action: **minor** adverse. Alternatives C through F would not result in benefits to water quality.

3.21.2.4 Mitigation

No potential additional mitigation measures for water quality are identified in Table F-2 in Appendix F.

3.22 Wetlands and Other Waters of the United States

3.22.1 Description of the Affected Environment and Environmental Consequences of the No Action Alternative for Wetlands and Other Waters of the United States

Geographic analysis area: The GAA for wetlands and other waters of the United States (WOTUS) is the Lower West Passage subwatershed (Hydrologic Unit Code 010900040908), which overlaps the onshore Project and is the same as the GAA for onshore water quality (see Figure 3.21-2). This area encompasses the drainage basin and network of surface waterbodies that could be affected by Project activities.

Affected environment: Freshwater and tidal wetlands, lakes and ponds, streams, and other WOTUS are found throughout the GAA (see Figure 3.21-2). Wetlands resources and their functions and values are described in Sections 1.3.2 and 3.1.2 of COP Appendix K (vhb 2021). As mapped by the USFWS National Wetlands Inventory, approximately 1,268.1 acres of freshwater forest/shrub wetlands and 99.3 acres of freshwater emergent wetlands are found near streams, lakes, and ponds throughout the GAA. In addition, estuarine and marine wetland habitat is found in tidal areas near the shore of Narragansett Bay.

WOTUS are subject to USACE jurisdiction under Section 404 of the federal Clean Water Act (CWA). However, as described in COP Appendix K, wetland resources also fall under the jurisdiction of the State of Rhode Island following pre-determined physical boundaries mapped on the Rhode Island DEM's Environmental Resource Map. Based on this map, the onshore Project components are to be located almost entirely within the jurisdiction of the RI CRMC with the exception of a potential segment of an onshore transmission cable route along Roger Williams Way between Mainsail Drive and Circuit Drive, where the jurisdictional WOTUS boundary follows Roger Williams Way (vhb 2021). Under the RI CRMC Coastal Resources Management Program-Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast (Freshwater Wetland Rules; 650-RICR-20-00-2), wetlands receive a buffer of 50 feet from the delineated edge of the wetland. The area of land within 50 feet is regulated as a separate wetland resource (RI CRMC 2011).

Freshwater and tidal wetlands (e.g., tidal salt marsh, ruderal forested wetland, ruderal shrub marsh, and vernal pools) were observed in the GAA during the field surveys (vhb 2021). Wetlands and streams delineated within the footprint of onshore Project components and the adjacent areas are shown on Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K. All wetlands, buffers, and ditches within the footprint are regulated by RI CRMC, as summarized in Table 3.22-1. Potentially jurisdictional WOTUS are located outside the footprint of onshore Project components.

Table 3.22-1. Delineated Wetlands by Project Component

Project Component	Freshwater Wetlands (acres)*	Wetland Buffer (acres)†	Regulated Ditch (feet)‡	Waters of the United States
Landfall work area	0	0	0	0
OnSS footprint	< 0.01	0.48	0	0
ICF footprint	0.10	0.24	148.38	0
Onshore cable corridor and envelope	0	0.07	0	0

Source: vhb (2021).

* Freshwater wetlands regulated by RI CRMC based on Environmental Resource Map.

† Area of land within 50 feet of the wetland boundary regulated by RI CRMC.

‡ Human-made ditch that is regulated by RI CRMC as an Area Subject to Stormwater Flowage.

The landfall work area was shifted east to avoid a delineated ruderal forested wetland (Freshwater Wetland 1) that is regulated by the RI CRMC as a freshwater wetland near the coast. Tidal salt marshes west of the landfall work area have also been avoided. There are no wetlands or WOTUS within the onshore transmission cable corridor or easement. However, the cable corridor crosses the 50-foot wetland buffer of Freshwater Wetland 1.

Regulated wetlands within and adjacent to the OnSS and ICF parcels include four freshwater wetlands (Freshwater Wetlands 2–5), tributaries to Mill Creek, and a human-made ditch. Freshwater Wetland 2 (i.e., a small isolated forested wetland) is outside of but adjacent to the OnSS footprint. Freshwater Wetland 3 (i.e., a forested swamp) occurs along the western boundary of the OnSS parcel and continues off-site around Mill Creek. Freshwater Wetland 4 (i.e., a shrub marsh with a forested perimeter) occurs along the northern boundary of the OnSS and ICF parcel. Wetland 5 is a small, isolated scrub-shrub wetland within the ICF footprint that is hydrologically connected to Freshwater Wetland 4 by a human-made ditch that is regulated as an Area Subject to Stormwater Flowage. Tributaries to Mill Creek flow north and west through Freshwater Wetland 3, outside the OnSS footprint (see Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K). Vernal pools were identified within Freshwater Wetlands 4 and 5. The OnSS and ICF footprints are designed to avoid most of the 3.92 acres of wetlands delineated within these parcels.

Warming temperatures, increasing storm severity and frequency, and ongoing rising sea levels impact wetland habitats. Large, severe storms can increase sedimentation and erosion, which can lead to habitat alteration. Offshore wind projects aim to combat climate change and associated effects by reducing GHG emissions.

3.22.1.1 Future Offshore Wind Activities (without Proposed Action)

This section discloses potential impacts to state regulated wetland resources (i.e., freshwater wetlands, buffer, and ditches) and nearby federally regulated WOTUS associated with future offshore wind development. In this and the following sections, the state wetlands and federal WOTUS are collectively referred to as *wetland resources*. Analysis of impacts associated with ongoing activities and future non–offshore wind activities is provided in Appendix E1.

Accidental releases and discharges: However, should offshore wind facilities be located within the GAA, there is a possibility of accidental releases of fuels, oils, and lubricants that could affect wetland resources. Any activity would require a facility-specific spill plan outlining spill prevention training, plans, and steps to contain and clean up spills if they occur. Spills that reach surface water would be expected to disperse rapidly (BOEM 2015). Adverse impacts from accidental releases and discharges would be **negligible** adverse, localized, and temporary to short term due to the likely limited extent and duration of a release.

Permitted routine operational effluent discharges to receiving waters (e.g., such as ballast water) are regulated by the NPDES. Any discharges from future offshore wind projects are not expected to affect wetland resources within the GAA.

New cable emplacement/maintenance: Future offshore wind projects do not include cable emplacement and maintenance within the GAA that would affect wetland resources.

Presence of structures: There are no known future offshore wind activities that have facilities planned within the GAA. Therefore, impacts to wetland resources would be **negligible** adverse.

3.22.1.2 Conclusions

Under the No Action Alternative, there are no known future offshore wind activities that could impact wetland resources in the GAA. Adverse impacts from future activities on onshore wetland resources under the No Action Alternative would be temporary to short term and **negligible** adverse. Impacts associated with future offshore wind activities in the GAA for onshore wetland resources combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small, and the resource would recover completely.

3.22.2 Environmental Consequences

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

The Project design parameters that would influence the magnitude of the impacts on wetland resources include the location of and construction of or within the OnSS, ICF, and landfall work area. The following have occurred or would occur to minimize potential impacts to wetland resources:

- Revolution Wind evaluated siting alternatives for the OnSS using the criteria that included avoidance or minimization of disturbance to wetlands and other ecologically sensitive areas.
- The OnSS and ICF would be located on parcels that are already highly altered and include buried demolition waste.
- Revolution Wind would follow state and federal regulations for alteration of wetland resources.

Erosion control measures implemented during both construction and decommissioning, as well as a facility-specific spill plan implemented during O&M, would decrease the potential for impacts to wetland resources. These Project design parameters would be implemented across all alternatives; therefore, BOEM would not expect potential variances in impacts across the alternatives.

See Appendix E1 for a summary of IPFs analyzed for wetland and WOTUS resources across all action alternatives. IPFs that are either not applicable to the resource or determined by BOEM to have a negligible adverse effect are excluded from Chapter 3 and provided in Table E2-2 in Appendix E1. Offshore and onshore IPFs are addressed separately in the analysis if appropriate for the resource; not all IPFs have both an offshore and onshore component. Where feasible, calculations for specific alternative impacts are provided in Appendix E4, to facilitate reader comparison across alternatives.

Table 3.22-2 provides a summary of IPF findings carried forward for analysis in this section. Each alternative analysis discussion consists of the construction and installation phase, the O&M phase, the decommissioning phase, and the cumulative analysis. If these analyses are not substantially different, then they are presented as one discussion.

A detailed analysis of the Proposed Action is provided following the table. Detailed analysis of other considered action alternatives is also provided below the table if analysis indicates that the alternative(s) would result in substantially different impacts than the Proposed Action.

The Conclusion section within each alternative analysis discussion includes rationale for the overall effect call determination for that alternative. The overall impact of any alternative would be **minor** adverse because the effects on wetland resources would be small and localized, and with implementation of EPMs, wetland resources are expected to recover completely.

Table 3.22-2. Alternative Comparison Summary for Wetlands and Other Waters of the United States Impact-Producing Factor

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Accidental releases and discharges	**Onshore**: Spills that reach surface water would be expected to disperse rapidly (BOEM 2015). Any discharges from future offshore wind projects are not expected to affect wetland resources within the GAA. Adverse impacts from accidental releases and discharges would be **negligible** adverse, localized, and temporary to short term due to the likely limited extent and duration of a release.	**Onshore**: Revolution Wind would prepare a construction-specific plan in accordance with applicable requirements and would outline spill prevention plans and steps to contain and clean up spills that may occur. All onshore activities would be conducted in compliance with the RI Pollutant Discharge Elimination System General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved soil erosion and sedimentation control plan. Therefore, with the implementation of these measures, accidental releases and discharges during onshore construction and installation are expected to result in short-term **minor** adverse impacts within adjacent wetland resources. The potential for accidental releases and discharges during O&M and decommissioning would be less than during construction and installation due to reduced use of drilling fluids, fuels, oils, and lubricants. Stormwater runoff during O&M of onshore facilities could result in turbidity and sediment deposition that could cause short-term **minor** adverse impacts to wetlands or other WOTUS. Therefore, impacts to wetland resources from accidental releases and discharges would be short term **minor** adverse. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities in the GAA. Any ballast water discharges from the Proposed Action and future offshore wind projects are not expected to affect wetland resources within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in short-term **negligible** to **minor** adverse impacts to wetland resources.	**Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action, therefore, impacts from accidental releases and discharges on wetland resources would be the same as those described for the Proposed Action: **negligible** to **minor** adverse.			
New cable emplacement/ maintenance	**Onshore**: Future offshore wind projects do not include cable emplacement and maintenance within the GAA that would affect wetland resources.	**Onshore**: No direct impacts to wetlands or other WOTUS would occur as a result of onshore cable emplacement or maintenance activities. Temporary soil disturbance during cable installation could disturb and alter nearby wetland habitat, as well as potentially spread invasive species, which could lead to a small, localized reduction in habitat quality. With erosion control and weed management measures in place, any impacts to adjacent wetlands during construction and installation would be short term **negligible** adverse. Land disturbance during O&M would be limited to regular maintenance of underground infrastructure, if needed, and EPMs would limit potential impacts from sedimentation. See Table F-1 in Appendix F for a list of EPMs for wetland resources. Adverse impacts on wetlands and WOTUS under the Proposed Action would be temporary **minor** adverse. The contribution to cumulative impacts to wetland resources from anchoring and cable emplacement is expected to be the same as the Proposed Action because no other past, present, and reasonably foreseeable projects requiring cable placement/maintenance would occur within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in **minor** adverse short-term impacts to wetlands and WOTUS due to surface disturbance in wetland buffers.	**Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action, therefore impacts on wetland resources would be the same as the Proposed Action: **negligible** to **minor** adverse.			

Impact-Producing Factor	No Action Alternative	Alternative B (Proposed Action) up to 100 WTG	Alternative C (Habitat Alternative) 64–65 WTGs	Alternative D (Transit Alternative) 78–93 WTGs	Alternative E (Viewshed Alternative) 64–81 WTGs	Alternative F (Higher Capacity Turbine Alternative) 56 WTGs
Presence of structures	**Onshore**: There are no known future offshore wind activities that have facilities planned within the GAA. Therefore, impacts to wetland resources would be **negligible** adverse.	**Onshore:** Land disturbances from the presence of structures associated with Project construction and installation would include the 19.53-acre landfall work area, 7.04-acre OnSS, 3.76-acre ICF, and 16.58-acre onshore transmission cable envelope. The OnSS and ICF structures would permanently remove and replace 0.11 acre of freshwater forested wetland with impervious surface (less than 0.1% of wetlands within the GAA). Soil disturbance during construction and installation could also alter nearby wetland habitat due to sedimentation and spread invasive species, leading to a small, localized reduction in habitat quality. Revolution Wind would also comply with all permit and regulatory requirements related to wetland and other WOTUS impacts, and the resources are expected to recover with mitigation. As a result, adverse impacts on wetland resources under the Proposed Action would be localized, short term **minor** adverse. O&M of the ICF and OnSS would not impact wetlands or other WOTUS. Project components would be demolished or decommissioned in place, limiting the potential for soils and materials to wash into adjacent wetland resources. Temporary **minor** adverse impacts to wetlands or other WOTUS adjacent to the structures could occur if debris from demolition washed into the adjacent wetland resources. Additional structures could cumulatively add to other onshore impacts due to an increase in impervious surface from reasonably foreseeable structures within the GAA. The Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term **minor** adverse impacts to wetland resources.	**Onshore**: Alternatives C through F would have the same onshore activities and facilities as the Proposed Action, therefore impacts would be the same as those described for the Proposed Action: **minor** adverse.			

3.22.2.2 Alternative B: Impacts of the Proposed Action on Wetlands and Other Waters of the United States

3.22.2.2.1 Construction and Installation

Onshore Activities and Facilities

Accidental releases and discharges: Onshore construction and HDD activities would require heavy equipment use, and an inadvertent release from the machinery or spill during refueling activities could occur. Onshore cables would not contain fluids and would not be susceptible to leaks that could affect water quality. The drilling rig used for HDD would be located within the landfall envelope where there are no wetlands or other WOTUS. Drilling fluids and mud would be transported off-site for treatment, disposal, and/or reuse. Revolution Wind would prepare a construction-specific plan in accordance with applicable requirements and would outline spill prevention plans and steps to contain and clean up spills that may occur.

To protect water quality, all onshore activities would be conducted in compliance with the RI Pollutant Discharge Elimination System General Permit for the Discharge of Stormwater Associated with Construction Activities and an approved soil erosion and sedimentation control plan. The measures employed in the soil erosion and sedimentation control plan would minimize the opportunity for turbid discharges leaving a construction work area. The plan would also include specific measures for handling dewatering discharges and measures for refueling equipment to minimize the opportunities for uncontrolled spills. Therefore, with the implementation of these measures, accidental releases and discharges during onshore construction and installation are expected to result in short-term **minor** adverse impacts within adjacent wetland resources.

New cable emplacement/maintenance: No direct impacts to wetlands or other WOTUS would occur as a result of onshore cable emplacement or maintenance activities. The landfall work area, which would be used during cable emplacement, avoids the nearby freshwater forested wetland (Freshwater Wetland 1) and wetland buffer (see Table 3.22-1). The onshore cable route would follow Circuit Drive and Camp Avenue to the OnSS, and no wetlands or other WOTUS are within the cable route. However, approximately 94 feet (28.65 m) of the onshore cable route crosses the 50-foot buffer of Freshwater Wetland 1, resulting in 0.07 acre of temporary disturbance in the buffer. Temporary soil disturbance during cable installation could disturb and alter nearby wetland habitat, as well as potentially spread invasive species, which could lead to a small, localized reduction in habitat quality. With erosion control and weed management measures in place, any impacts to adjacent wetlands during construction and installation would be short term **negligible** adverse. The cable corridor would be fully restored once construction and installation is complete.

Presence of structures: Land disturbances from the presence of structures associated with Project construction and installation would include the 19.53-acre landfall work area, 7.04-acre OnSS, 3.76-acre ICF, and 16.58-acre onshore transmission cable envelope. The new OnSS and ICF would be constructed adjacent to the existing Davisville Substation to support interconnection of the Project to the existing electrical grid. These structures would permanently remove and replace 0.11 acre of freshwater forested wetland with impervious surface. This amounts to 2.6% of the 3.92 acres of delineated wetlands within the OnSS and ICF parcels, and less than 0.1% of mapped wetlands in the GAA (Lower West Passage subwatershed). There are no streams or other waterbodies within the footprint of the onshore facilities;

however, Mill Creek is adjacent to the OnSS. Freshwater wetlands and wetland buffers within onshore components are detailed in Table 3.22-1 and in Figures 4.3.1-3 and 4.3.1-13 in COP Appendix K. Approximately 0.11 acre of freshwater wetlands and 143.38 feet of an Area Subject to Stormwater Flowage—regulated ditch—would be directly impacted by construction and installation of the onshore facilities. Clearing, grading, and hardening in these areas could directly and indirectly impact wetland resources. Soil disturbance during construction and installation could also alter nearby wetland habitat due to sedimentation (see Section 3.21) and spread invasive species, leading to a small, localized reduction in habitat quality. Impacts to wetlands would be permitted and mitigated as described in Appendix F, resulting in recovery of the resource. Implementing EPMs such as erosion and sedimentation BMPs (see Table F-1 in Appendix F) would avoid or minimize impacts on water quality, wetlands, and WOTUS. Revolution Wind would also comply with all permit and regulatory requirements related to wetland and other WOTUS impacts, and the resources are expected to recover with mitigation. As a result, adverse impacts on wetland resources under the Proposed Action would be localized, short term **minor** adverse.

3.22.2.2.2 Operations and Maintenance and Decommissioning

Onshore Activities and Facilities

Accidental releases and discharges: The potential for accidental releases and discharges during O&M and decommissioning would be less than during construction and installation due to reduced use of drilling fluids, fuels, oils, and lubricants. The additional impervious surfaces at onshore Project facilities during O&M would increase the amount of runoff and stormwater pollutants delivered to nearby wetland resources. Wetlands are important habitats for supporting wildlife, and stormwater runoff filtration and stormwater runoff during O&M could have a short-term effect on turbidity and sediment deposition that could impact wetlands or other WOTUS. Revolution Wind would prepare a construction-specific spill plan in accordance with applicable requirements and would outline spill prevention training, plans, and steps to contain and clean up spills that may occur. Therefore, impacts to wetland resources from accidental releases and discharges would be short term **minor** adverse.

New cable emplacement/maintenance: If O&M activities related to the onshore cable are within the segment of the ROW that crosses the 50-foot buffer of Freshwater Wetland 1, then temporary soil disturbance could alter nearby wetland habitat and spread invasive species, leading to a reduction in habitat quality. Land disturbance during O&M would be limited to regular maintenance of underground infrastructure (i.e., transmission cable discussed above under Section 3.22.2.2.1), if needed, and EPMs would limit potential impacts from sedimentation. Adverse impacts on wetlands and WOTUS under the Proposed Action would be temporary **minor** adverse.

Presence of structures: For onshore facilities, no land disturbance is anticipated during regular maintenance. O&M of the ICF and OnSS would not impact wetlands or other WOTUS. During decommissioning of the ICF and OnSS facilities, the Project components would be demolished or decommissioned in place, limiting the potential for soils and materials to wash into adjacent wetland resources. Pre-existing habitats are not likely to be restored as part of decommissioning. Temporary **minor** adverse impacts to wetlands or other WOTUS adjacent to the structures could occur if debris from demolition washed into the adjacent wetland resources.

3.22.2.2.3 Cumulative Impacts

Onshore Activities and Facilities

Accidental releases and discharges: The Proposed Action could contribute construction-related accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities in the GAA. These types of releases, if any, would occur infrequently at discrete locations in the watershed and at varied times. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in short-term **negligible** adverse impacts to wetland resources.

Permitted routine operational effluent discharges to receiving waters are regulated by the NPDES. Any ballast water discharges from the Proposed Action and future offshore wind projects are not expected to affect wetland resources within the GAA. Stormwater runoff during O&M of onshore facilities could result in turbidity and sediment deposition that could cause short-term **minor** adverse impacts to wetlands or other WOTUS. Overall, the contribution to cumulative impacts to wetland resources is expected to be localized, temporary **minor** adverse.

New cable emplacement/maintenance: The contribution to cumulative impacts to wetland resources from anchoring and cable emplacement is expected to be the same as the Proposed Action because no other past, present, and reasonably foreseeable projects requiring cable placement/maintenance would occur within the GAA. As a result, the Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in **minor** adverse short-term impacts to wetlands and WOTUS due to surface disturbance in wetland buffers.

Presence of structures: The Proposed Action includes the OnSS and ICF structures that would remove and replace 0.11 acre of freshwater forested wetland with impervious surface, which is less than 0.1% of mapped wetlands in the GAA (Lower West Passage subwatershed) and 2.6% of wetlands delineated in those parcels. Additional structures could cumulatively add to other onshore impacts due to an increase in impervious surface from reasonably foreseeable structures within the GAA; however, only a small percentage of the 1,367.4 acres of freshwater wetlands are expected to be impacted. The Proposed Action, when combined with past, present, and reasonably foreseeable projects, would result in long-term **minor** adverse impacts to wetland resources.

3.22.2.2.4 Conclusions

Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination, hazardous materials or debris into onshore surface waters that could affect wetland resources in the GAA. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse because the effect would be small and localized. Further, the resource would be expected to recover completely with remedial or mitigating action(s). The Proposed Action would not result in any net beneficial change to wetlands or other WOTUS.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all IPFs together, BOEM anticipates that the overall impacts associated with the Proposed

Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts to wetlands and WOTUS because the effects are expected to be small and localized. Further, with implementation of EPMs, wetland resources are expected to recover completely.

3.22.2.3 Alternatives C, D, E, and F

Table 3.22-2 discloses IPF findings for each alternative.

3.22.2.3.1 Conclusions

Under Alternatives C through F, Project construction and installation, O&M, and decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination, hazardous materials, or debris into onshore surface waters that could affect wetland resources in the GAA. BOEM anticipates that impacts resulting from each alternative alone would range from **negligible** to **minor** adverse because the effect would be small and localized. Further, the resource would be expected to recover completely with remedial or mitigating action(s). Alternatives C through F would not result in any net beneficial change to wetlands or other WOTUS.

In the context of other reasonably foreseeable environmental trends and planned actions, the impacts under Alternatives C through F resulting from individual IPFs would range from **negligible** to **minor** adverse. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with each alternative, when combined with past, present, and reasonably foreseeable activities, would result in **minor** adverse impacts to wetlands and WOTUS because the effects are expected to be small and localized. Further, with implementation of EPMs, wetland resources are expected to recover completely.

3.22.2.4 Mitigation

No potential additional mitigation measures for wetland resources are identified in Table F-2 in Appendix F.

APPENDIX E3

Maximum-Case Scenario Estimates for Offshore Wind Projects

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

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Introduction

Table E3-1 (parts 1–10) provides maximum-case scenario estimates of potential offshore wind project impacts assuming maximum buildout, using the geographic analysis areas in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) project environmental impact statement (EIS) and construction and operations plan–designated numbers for the RWF and RWEC. The Bureau of Ocean Energy Management (BOEM) developed these estimates based on offshore wind demand, as discussed in its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Estimates disclosed in the EIS's Chapter 3, No Action analyses were developed by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely overestimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development.

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Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 1)

Region	Lease/Project/ Lease Remainder[1]	Status	Resource/Projects[3]							Estimated Offshore Construction Schedule[4]	Expected Turbine Size[5]
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/ Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice		
NE	NE Aquaventus (state waters)	State Project				X				2023	11 MW
NE	Block Island (state waters)	State Project, Built	X	X		X	X	X	X	Built	6 MW
	Total State Waters										
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD				X	X	X	X	2023	up to 14 MW
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	X	X		X	X	X	X	2023	6 - 12 MW
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X	X		X	X	X	X	2024	11 MW
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	X			X	X	X	X	2024-2026	13 to 16 MW
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	X			X	X	X	X	2024-2026	13 to 19 MW
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA				X	X	X	X	2025	12 MW+
MA/RI	Beacon Wind, part of OCS-A 0520	PPA				X	X	X	X	2025-2026	12 MW
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	X	X		X	X	X	X	By 2030, spread over 2025-2030	12 MW
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.				X	X	X	X	By 2030, spread over 2025-2030	12 MW
MA/RI	OCS-A 0500 remainder[c]		X			X	X	X	X		
MA/RI	OCS-A 0487 remainder[c]		X	X		X	X	X	X		
MA/RI	OCS-A 0520 remainder					X	X	X	X		
	Remaining MA/RI Lease Area Total[2]	88%									
	Total MA/RI Leases (without Proposed Actions)[2]										
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				X			X	2023-2024	12 MW
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA				X			X	2024-2025	10 - 18 MW
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA				X			X	2023-2027	
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA				X			X	2025-2027	>12 MW
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA				X			X	By 2030, spread over 2026-2030	12 MW
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)					X			X	By 2030, spread over 2026-2030	12 MW
NY/NJ	Central Bight, OCS-A 0537					X			X	By 2030, spread over 2026-2030	12 MW
NY/NJ	Hudson South B, OCS-A 0538					X			X		12 MW
NY/NJ	Hudson South C, OCS-A 0539					X			X		12 MW
NY/NJ	Hudson South E, OCS-A 0541					X			X		12 MW
NY/NJ	Hudson South F, OCS-A 0542					X			X		12 MW
NY/NJ	Hudson North, OCS-A 0544					X			X		12 MW
	TOTAL NY/NJ LEASES										
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				X			X	2024	12 MW
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				X			X	2024	8.6 - 12 MW
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				X			X	By 2030, spread over 2023-2030	12 MW
DE/MD	OCS-A 0519 remainder					X			X		12 MW

Region	Lease/Project/ Lease Remainder[1]	Status	Resource/Projects[3]							Estimated Offshore Construction Schedule[4]	Expected Turbine Size[5]
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/ Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice		
	Remaining DE/MD Lease Area Total					X			X		
	TOTAL DE/MD LEASES										
VA/NC	CVOW, OCS-A 0497	Built				X			X	Built	6 MW
VA/NC	CVOW-C, OCS-A 0483	COP				X			X	2024-2025	14-16 MW
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				X			X	2025-2026	14-18 MW
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)				X			X	2026-2027	14-18 MW
	TOTAL VA/NC LEASES										
	OCS Total (without Proposed Action)[24, 25]:										

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 2)

Region	Lease/Project/ Lease Remainder[1]	Status	Generating Capacity (MW) (INTERNAL NOTE - FULL MW)							Generating Capacity (MW)							Offshore Export Cable Length (Statute Miles)[8]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Inter-array Cable Length (Statute Miles)[9]
			Air[6]	Water[7]	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air[6]	Water[7]	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice			
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	11	NA	NA	NA	NA	NA	NA	11	NA	NA	NA			
NE	Block Island (state waters)	State Project, Built	30	30	NA	30	30	30	30	30	30	NA	30	30	30	30	28	5	2
	Total State Waters		**30**	**30**	**NA**	**41**	**30**	**30**	**30**	**30**	**30**	**NA**	**41**	**30**	**30**	**30**	**28**	**5**	**2**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	800	800	800	800	NA	NA	NA	800	800	800	800	98	6.5	171
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	130	130	130	130	130	130	130	130	130	130	130	130	130	130	139	6.5	24
MA/RI	Sunrise, OCS-A 0487	COP, PPA	1122	1122	NA	1122	1122	1122	1122	1122	1122	NA	1122	1122	1122	1122	106	6.5	180
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	804	NA	NA	804	804	804	804	804	NA	NA	804	804	804	804	125	10	139
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	1500	NA	NA	1500	1500	1500	1500	1,500	NA	NA	1500	1500	1500	1500	225	10	201
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	804	804	804	804	NA	NA	NA	804	804	804	804	744	6.5	497
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA	1,230	1,230	1,230	1,230	NA	NA	NA	1,230	1,230	1,230	1,230	120	6.5	163.08
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	1,092	1,092	NA	1,092	1,092	1,092	1,092	1,092	1,092	NA	1,092	1,092	1,092	1,092	120	6.5	171.96
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	NA	NA	NA	4,200	4,200	948	4,192	NA	NA	NA	3,876	3,876	948	3,876	120	6.5	504.96
MA/RI	OCS-A 0500 remainder[c]		852	120	NA			3,876		71	10	NA					120		
MA/RI	OCS-A 0487 remainder[c]		48	48	NA			3,876		48	48	NA					120		
MA/RI	OCS-A 0520 remainder		NA	NA	NA			3,876		NA	NA	NA					120		

Region	Lease/Project/ Lease Remainder[1]	Status	Generating Capacity (MW) (INTERNAL NOTE - FULL MW)							Generating Capacity (MW)							Offshore Export Cable Length (Statute Miles)[8]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Inter-array Cable Length (Statute Miles)[9]
			Air[6]	Water[7]	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air[6]	Water[7]	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice			
	Remaining MA/RI Lease Area Total[2]	88%	48	120	NA					4,767	2,402	NA			948		600	6.5	677
	Total MA/RI Leases (without Proposed Actions)[2]		**5,596**	**2,632**	**130**	**11,682**	**11,682**	**20,058**	**11,674**	**4,767**	**2,402**	**130**	**11,358**	**11,358**	**8,430**	**11,358**	**2,157**	**NA**	**2,052**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				1,100			1,100	NA	NA	NA	1,100	NA	NA	1,100	142	5	142
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA				816			816	NA	NA	NA	816	NA	NA	816	40	7	116
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA				1,260			1,260	NA	NA	NA	1,260	NA	NA	1,260	26	7	144
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA				1,510			1,510	NA	NA	NA	1,510	NA	NA	1,510	342	13	584
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA				1,554			1554	NA	NA	NA	1,554	NA	NA	1,554	120	5	173
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)					2,198			2,198	NA	NA	NA	2,198	NA	NA	2,198	120	7	242
NY/NJ	Central Bight, OCS-A 0537					868			868	NA	NA	NA	868	NA	NA	868	120	5	120
NY/NJ	Hudson South B, OCS-A 0538					964			964	NA	NA	NA	964	NA	NA	964	120	5	120
NY/NJ	Hudson South C, OCS-A 0539					1,387			1,387	NA	NA	NA	1,387	NA	NA	1,387	120	5	120
NY/NJ	Hudson South E, OCS-A 0541					924			924	NA	NA	NA	924	NA	NA	924	120	5	120
NY/NJ	Hudson South F, OCS-A 0542					934			934	NA	NA	NA	934	NA	NA	934	120	5	120
NY/NJ	Hudson North, OCS-A 0544					523			523	NA	NA	NA	523	NA	NA	523	120	5	120
	TOTAL NY/NJ LEASES					**14,038**			**14,038**	NA	NA	NA	**14,038**	**NA**	NA	**14,038**	**1510**		**2121**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				120			120	NA	NA	NA	120	NA	NA	120	40	10	30
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				1500			1500	NA	NA	NA	1500	NA	NA	1500	190	6.5	151
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				1,080			1,080	NA	NA	NA	1,080	NA	NA	1,080	n.d	n.d	n.d
DE/MD	OCS-A 0519 remainder									NA	NA	NA		NA	NA		n.d.	n.d	n.d
	Remaining DE/MD Lease Area Total									NA	NA	NA		NA	NA		240	5	139
	TOTAL DE/MD LEASES					**2,700**			**2700**	NA	NA	NA	**2,700**	NA	NA	**2,700**	**470**		**320**
VA/NC	CVOW, OCS-A 0497	Built				12			12	NA	NA	NA	12	NA	NA	12	27	3.3	9
VA/NC	CVOW-C, OCS-A 0483	COP				3,000			3000	NA	NA	NA	3,000	NA	NA	3,000	417	5	301
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				1,242			1,242	NA	NA	NA	1,242	NA	NA	1,242	112	6.5	149
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)				1,242			1,242	NA	NA	NA	1,242	NA	NA	1,242	200	6.5	149
	TOTAL VA/NC LEASES					**5,496**			**5,496**	NA	NA	NA	**5,496**	NA	NA	**5,496**	**756**	**NA**	**608**
	OCS Total (without Proposed Action)[24, 25]:		**5,626**	**2,662**	**130**	**33,957**	**11,712**	**20,088**	**33,938**	**4,797**	**2,432**	**130**	**33,633**	**11,388**	**8,460**	**33,622**	**4,921**	**NA**	**5,103**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 3)

Region	Lease/Project/ Lease Remainder[1]	Status	Hub Height (Feet)[10]							Rotor Diameter (Feet)[11]							Total Height of Turbine (Feet)[12]						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA					NA	NA	NA	450	450	450	450	NA	NA	NA	520	520	520	520
NE	Block Island (state waters)	State Project, Built	NA	NA	NA	328	328	328	328	NA	NA	NA	541	541	541	541	NA	NA	NA	659	659	659	659
	Total State Waters		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	451	451	451	451	NA	NA	NA	721	721	721	721	NA	NA	NA	812	812	812	812
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	358	358	NA	358	358	358	358	543	543	543	543	543	722	722	614	614	614	614	614	853	853
MA/RI	Sunrise, OCS-A 0487	COP, PPA	459	459	NA	459	459	459	459	656	656	NA	656	656	656	656	787	787	NA	787	787	787	787
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	630	NA	NA	630	630	630	630	837	NA	NA	837	837	837	837	1047	NA	NA	1047	1047	1047	1047
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	702	NA	NA	702	702	702	702	935	NA	NA	935	935	935	935	1171	NA	NA	1171	1171	1171	1171
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	605	605	605	605	NA	NA	NA	919	919	919	919	NA	NA	NA	1066	1066	1066	1066
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA	492	492	492	492	NA	NA	NA	722	722	722	722	NA	NA	NA	853	853	853	853
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	492	492	NA	492	492	492	492	722	722	NA	722	722	722	722	853	853	NA	853	853	853	853
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	NA	NA	NA	492	492	492	492	NA	NA	NA	722	722	722	722	NA	NA	NA	853	853	853	853
MA/RI	OCS-A 0500 remainder[c]		492	492	NA	492	492	492	492	722	722	NA	722	722	722	722	853	853	NA	853	853	853	853
MA/RI	OCS-A 0487 remainder[c]		NA	NA	NA	492	492	492	492	NA	NA	NA	722	722	722	722	NA	NA	NA	853	853	853	853
MA/RI	OCS-A 0520 remainder		NA	NA	NA	492	492	492	492	NA	NA	NA	722	722	722	722	NA	NA	NA	853	853	853	853
	Remaining MA/RI Lease Area Total[2]	88%	NA	NA	NA	492	492	492	492	NA	NA	NA	722	722	722	722	NA	NA	NA	853	853	853	853
	Total MA/RI Leases (without Proposed Actions)[2]		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	NA	512	NA	NA	512	NA	NA	NA	788	NA	NA	788	NA	NA	NA	906	NA	NA	906
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	NA	525	NA	NA	525	NA	NA	NA	853	NA	NA	853	NA	NA	NA	951	NA	NA	951
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	NA	525	NA	NA	525	NA	NA	NA	853	NA	NA	853	NA	NA	NA	951	NA	NA	951
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	NA	576	NA	NA	576	NA	NA	NA	919	NA	NA	919	NA	NA	NA	1049	NA	NA	1049
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	NA	512	NA	NA	512	NA	NA	NA	788	NA	NA	788	NA	NA	NA	906	NA	NA	906
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	NA	576	NA	NA	576	NA	NA	NA	919	NA	NA	919	NA	NA	NA	1049	NA	NA	1049
NY/NJ	Central Bight, OCS-A 0537		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
NY/NJ	Hudson North, OCS-A 0544		NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
	TOTAL NY/NJ LEASES																						
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	NA	492	NA	NA	492	NA	NA	NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	NA	440	NA	NA	440	NA	NA	NA	722	NA	NA	722	NA	NA	NA	801	NA	NA	801
DE/MD	GSOE I, OCS-A 0482		NA	NA	NA	492	NA	NA	492	NA		NA	722	NA	NA	722	NA	NA	NA	853	NA	NA	853

Region	Lease/Project/ Lease Remainder[1]	Status	Hub Height (Feet)[10]							Rotor Diameter (Feet)[11]							Total Height of Turbine (Feet)[12]						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/ Recreation-Tourism	Demographics/ Environmental Justice
DE/MD	OCS-A 0519 remainder	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	NA		NA	NA		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	n.d.	NA	NA	n.d.
	TOTAL DE/MD LEASES		NA	NA	NA	**NA**	NA	NA	**NA**	NA	NA	NA	**NA**	NA	NA	**NA**	NA	NA	NA	**NA**	NA	NA	**NA**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	NA	364	NA	NA	364	NA	NA	NA	506	NA	NA	506	NA	NA	NA	620	NA	NA	620
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	NA	482	NA	NA	482	NA	NA	NA	761	NA	NA	761	NA	NA	NA	869	NA	NA	869
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	NA	472	NA	NA	574	NA	NA	NA	728	NA	NA	935	NA	NA	NA	837	NA	NA	1042
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	NA	472	NA	NA	574	NA	NA	NA	728	NA	NA	935	NA	NA	NA	837	NA	NA	1042
	TOTAL VA/NC LEASES		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	OCS Total (without Proposed Action)[24, 25]:		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 4)

Region	Lease/Project/ Lease Remainder[1]	Status	Turbine Number[13]							Estimated Foundation Number[14]							Total Footprint of Foundations[15] (Acres)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	2	2	NA	2	2	2	2	2	2		2	2	2	2	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	5	5	NA	5	5	5	5	5	5		5	5	5	5	NA	NA	NA	1	1	1	1
	Total State Waters		**7**	**7**	**NA**	**7**	**7**	**7**	**7**	**7**	**7**		**7**	**7**	**7**	**7**	**NA**	**NA**	**NA**	**1**	**NA**	**NA**	**1**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	62	62	62	62	NA	NA	NA	63	63	63	63	NA	NA	NA	1.3	1.3	1.3	1.3
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	12	12	12	12	12	12	12	13	13	13	13	13	13	13	1	1	1	1	1	1	1
MA/RI	Sunrise, OCS-A 0487	COP, PPA	102	102	NA	102	102	102	102	103	103	NA	103	103	103	103	3	3	NA	3	3	3	3
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	5	NA	NA	62	62	62	62	5	NA	NA	64	64	64	64	0.13	NA	NA	1.7	1.7	1.7	1.7
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	79	NA	NA	79	79	79	79	82	NA	NA	82	82	82	82	2.7	NA	NA	2.7	2.7	2.7	2.7
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	147	147	147	147	NA	NA	NA	149	149	149	149	NA	NA	NA	139	139	139	139
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA	103	103	103	103	NA	NA	NA	106	106	106	106	NA	NA	NA	5	5	5	5
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	91	65	NA	110	110	110	110	93	67	NA	112	112	112	112	9.3	6.7	NA	11	11	11	11
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the	NA	NA	NA	323	323	34	323	NA	NA	NA	337	337	35	337	NA	NA	NA	33.7	33.7	3.5	33.7
MA/RI	OCS-A 0500 remainder[c]		71	10	NA			218		73	11	NA			219		7.3	1.1	NA			22	
MA/RI	OCS-A 0487 remainder[c]		4	4	NA					4	4	NA					0.4	0.4	NA				

Region	Lease/Project/ Lease Remainder[1]	Status	Turbine Number[13]							Estimated Foundation Number[14]							Total Footprint of Foundations[15] (Acres)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
MA/RI	OCS-A 0520 remainder	remaining technical capacity is 4,764 MW.	NA	NA	NA					NA	NA	NA					NA	NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	166	79	0	433	433	362	433	170	82	NA	449	449	366	449	17.0	8.2	0	45	45	37	45
	Total MA/RI Leases (without Proposed Actions)[2]		**364**	**193**	**12**	**1,000**	**1,000**	**929**	**1,000**	**373**	**198**	**13**	**1,029**	**1,029**	**946**	**1,029**	**23**	**12**	**1**	**199**	**199**	**190**	**199**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	NA	98	NA	NA	98	NA	NA	NA	101	NA	NA	101	NA	NA	NA	4	NA	NA	4
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	NA	71	NA	NA	71	NA	NA	NA	72	NA	NA	72	NA	NA	NA	42	NA	NA	42
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	NA	103	NA	NA	103	NA	NA	NA	104	NA	NA	104	NA	NA	NA	61	NA	NA	61
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	NA	200	NA	NA	200	NA	NA	NA	210	NA	NA	210	NA	NA	NA	9	NA	NA	9
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	NA	111	NA	NA	111	NA	NA	NA	113	NA	NA	113	NA	NA	NA	5	NA	NA	5
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	NA	157	NA	NA	157	NA	NA	NA	159	NA	NA	159	NA	NA	NA	7	NA	NA	7
NY/NJ	Central Bight, OCS-A 0537		NA	NA	NA	72	NA	NA	72	NA	NA	NA	74	NA	NA	74	NA	NA	NA	7	NA	NA	7
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	NA	80	NA	NA	80	NA	NA	NA	82	NA	NA	82	NA	NA	NA	8	NA	NA	8
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	NA	116	NA	NA	116	NA	NA	NA	118	NA	NA	118	NA	NA	NA	12	NA	NA	12
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	NA	77	NA	NA	77	NA	NA	NA	79	NA	NA	79	NA	NA	NA	8	NA	NA	8
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	NA	78	NA	NA	78	NA	NA	NA	80	NA	NA	80	NA	NA	NA	8	NA	NA	8
NY/NJ	Hudson North, OCS-A 0544		NA	NA	NA	44	NA	NA	44	NA	NA	NA	45	NA	NA	45	NA	NA	NA	4	NA	NA	4
	TOTAL NY/NJ LEASES		NA	NA	NA	**1207**	NA	NA	**1207**	NA	NA	NA	**1237**	NA	NA	**1237**	NA	NA	NA	**174**	**NA**	**NA**	**174**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	NA	16	NA	NA	16	NA	NA	NA	17	NA	NA	17	NA	NA	NA	0.7	NA	NA	0.7
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	NA	125	NA	NA	125	NA	NA	NA	129	NA	NA	129	NA	NA	NA	5	NA	NA	5
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	NA	90	NA	NA	90	NA	NA	NA	93	NA	NA	93	NA	NA	NA	3.7	NA	NA	3.7
DE/MD	OCS-A 0519 remainder		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	NA	90	NA	NA	90	NA	NA	NA	93	NA	NA	93	NA	NA	NA	4	NA	NA	4
	TOTAL DE/MD LEASES		NA	NA	NA	**321**	NA	NA	**321**	NA	NA	NA	**332**	NA	NA	**332**	NA	NA	NA	**13**	NA	NA	**13**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	NA	2	NA	NA	2	NA	NA	NA	2	NA	NA	2	NA	NA	NA	0.1	NA	NA	0.1
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	NA	205	NA	NA	205	NA	NA	NA	208	NA	NA	208	NA	NA	NA	8	NA	NA	8
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	NA	69	NA	NA	69	NA	NA	NA	70	NA	NA	70	NA	NA	NA	3	NA	NA	3
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	NA	121	NA	NA	121	NA	NA	NA	123			123	NA	NA	NA	5	NA	NA	5
	TOTAL VA/NC LEASES		NA	NA	NA	**397**	NA	NA	**397**	NA	NA	NA	**403**	NA	NA	**403**	NA	NA	NA	**16**	NA	NA	**16**
	OCS Total (without Proposed Action)[24, 25]:		**371**	**200**	**12**	**2,932**	**1,007**	**936**	**2,932**	**380**	**205**	**13**	**3,008**	**1,036**	**953**	**3,008**	**23**	**12**	**1**	**403**	**199**	**190**	**403**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 5)

Region	Lease/Project/ Lease Remainder[1]	Status	Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (Acres)[16]							Offshore Export Cable Seabed Disturbance (Acres)[17]						Offshore Export Cable Operating Seabed Footprint (Acres)[18]					
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	NA	NA	NA	6	6	6	6	11.61	NA	11.61	11.61	11.61	11.61	11.61	NA	11.61	11.61	11.61	11.61
	Total State Waters		**NA**	**NA**	**NA**	**6**	**6**	**6**	**6**	**11.61**	**NA**	**11.61**	**11.61**	**11.61**	**11.61**	**11.61**	**NA**	**11.61**	**11.61**	**11.61**	**11.61**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	32.7	32.7	32.7	32.7	NA	NA	69	69	69	69	NA	NA	77	77	77	77
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	11	11	11	11	11	11	11	555	555	555	555	555	555	7	7	7	7	7	7
MA/RI	Sunrise, OCS-A 0487	COP, PPA	108	108	NA	108	108	108	108	1,259	NA	1,259	1,259	1,259	1,259	84	NA	102	102	102	102
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	6.7	NA	NA	86	86	86	86	NA	NA	263	263	263	263	NA	NA	22	22	22	22
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	98	NA	NA	98	98	98	98	NA	NA	243	243	243	243	NA	NA	32	32	32	32
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	1,697	1,697	1,697	1,697	NA	NA	2,480	2,480	2,480	2,480	NA	NA	586	586	586	586
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA	265	265	265	265	NA	NA	143	143	143	143	NA	NA	95	95	95	95
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	93	67	NA	112	112	112	112	NA	NA	143	143	143	143	NA	NA	95	95	95	95
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	NA	NA	NA	337	337	35	337	NA	NA	713	713	856	713	NA	NA	473	473	567	473
MA/RI	OCS-A 0500 remainder[c]		73	11	NA			219		150	NA					48	NA				
MA/RI	OCS-A 0487 remainder[c]		4	4	NA					150	NA					48	NA				
MA/RI	OCS-A 0520 remainder		NA	NA	NA					NA	NA					NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	170	82	0	449	449	366	449	300	NA	856	856	999	856	96	NA	567	567	662	567
	Total MA/RI Leases (without Proposed Actions)[2]		**394**	**201**	**11**	**2,747**	**2,747**	**2,664**	**2,747**	**2,114**	**555**	**5,868**	**5,868**	**6,011**	**5,868**	**187**	**7**	**1,488**	**1,488**	**1,583**	**1,488**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	NA	80	NA	NA	80	NA	NA	169	NA	NA	169	NA	NA	86	NA	NA	86
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	NA	645	NA	NA	645	NA	NA	50	NA	NA	50	NA	NA	16	NA	NA	16
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	NA	936	NA	NA	936	NA	NA	33	NA	NA	33	NA	NA	10	NA	NA	10
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	NA	135	NA	NA	135	NA	NA	427	NA	NA	427	NA	NA	137	NA	NA	137
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	NA	96	NA	NA	96	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	NA	135	NA	NA	135	NA	NA	124	NA	NA	124	NA	NA	40	NA	NA	40
NY/NJ	Central Bight, OCS-A 0537		NA	NA	NA	74	NA	NA	74	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	NA	82	NA	NA	82	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	NA	118	NA	NA	118	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	NA	79	NA	NA	79	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	NA	80	NA	NA	80	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
NY/NJ	Hudson North, OCS-A 0544		NA	NA	NA	45	NA	NA	45	NA	NA	150	NA	NA	150	NA	NA	48	NA	NA	48
	TOTAL NY/NJ LEASES		**NA**	**NA**	**NA**	**2505**	**NA**	**NA**	**2505**	**NA**	**NA**	**1853**	**NA**	**NA**	**1853**	**NA**	**NA**	**625**	**NA**	**NA**	**625**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	NA	14	NA	NA	14	NA	NA	48	NA	NA	48	NA	NA	50	NA	NA	50
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	NA	110	NA	NA	110	NA	NA	226	NA	NA	226	NA	NA	150	NA	NA	150

Region	Lease/Project/ Lease Remainder[1]	Status	Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (Acres)[16]							Offshore Export Cable Seabed Disturbance (Acres)[17]						Offshore Export Cable Operating Seabed Footprint (Acres)[18]					
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	NA	79.05	NA	NA	79.05	NA	NA	286	NA	NA	286	NA	NA	145	NA	NA	145.455
DE/MD	OCS-A 0519 remainder		NA	NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	NA	79	NA	NA	79	NA	NA	286	NA	NA	286	NA	NA	145	NA	NA	145
	TOTAL DE/MD LEASES		NA	NA	NA	**282**	NA	**NA**	**282**	NA	NA	**846**	**NA**	**NA**	**846**	NA	NA	**491**	**NA**	**NA**	**491**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	NA	2	NA		2	NA	NA	33	NA	NA	33	NA	NA	11	NA	NA	11
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	NA	177	NA	NA	177	NA	NA	1,971	NA	NA	1,971	NA	NA	253	NA	NA	253
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	NA	60	NA	NA	60	NA	NA	134	NA	NA	134	NA	NA	88	NA	NA	88
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	NA	105	NA	NA	104.55	NA	NA	238	NA	NA	238	NA	NA	158	NA	NA	158
	TOTAL VA/NC LEASES		NA	NA	NA	**343**	NA	**NA**	**343**	**NA**	**NA**	**2,376**	**NA**	**NA**	**2,376**	**NA**	**NA**	**509**	**NA**	**NA**	**509**
	OCS Total (without Proposed Action)[24, 25]:		**394**	**201**	**11**	**5,883**	**2,753**	**2,670**	**5,883**	**2,126**	**555**	**10,954**	**5,880**	**6,023**	**10,954**	**198**	**7**	**3,126**	**1,500**	**1,595**	**3,126**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 6)

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Hard Protection (Acres)[19]						Anchoring Disturbance (Acres)[20]						Inter-array Construction Footprint/ Seabed Disruption (Acres)[21]					
			Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	NA	NA	NA	NA	NA	NA	0.5	NA	0.5	0.5	0.5	0.5	12	NA	4	4	4	4
	Total State Waters		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.5**	**NA**	**0.5**	**0.5**	**0.5**	**0.5**	**12**	**NA**	**4**	**NA**	**4**	**4**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	35	35	35	35	NA	NA	4	4	4	4	NA	NA	129	129	129	129
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	7	7	7	7	7	7	663	663	663	663	663	663	340	340	340	340	340	340
MA/RI	Sunrise, OCS-A 0487	COP, PPA	25	NA	25	25	25	25	11	NA	11	11	11	11	462	NA	462	462	462	462
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	NA	NA	22	22	22	22	NA	NA	34	34	34	34	NA	NA	222	222	222	222
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	NA	NA	32	32	32	32	NA	NA	50	50	50	50	NA	NA	321	321	321	321
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	471	471	471	471	NA	NA	442	442	442	442	NA	NA	1408	1408	1408	1408
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	43	43	43	43	NA	NA	442	442	442	442	NA	NA	247	247	247	247
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	NA	NA	43	43	43	43	NA	NA	442	442	442	442	160.8	NA	264	264	218	264
MA/RI	Liberty Wind (OCS-A 0522)		NA	NA	214	214	257	214	NA	NA	60	60	72	60	NA	NA	775	775	775	775

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Hard Protection (Acres)[19]						Anchoring Disturbance (Acres)[20]						Inter-array Construction Footprint/ Seabed Disruption (Acres)[21]					
			Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
MA/RI	OCS-A 0500 remainder[c]	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	4.3	NA					12	NA					24	NA				
MA/RI	OCS-A 0487 remainder[c]		4.3	NA					12	NA					10	NA				
MA/RI	OCS-A 0520 remainder		NA	NA					NA	NA					NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	9	NA	257	257	300	257	24	NA	502	502	514	502	194	0	1,039	1,039	993	1,039
	Total MA/RI Leases (without Proposed Actions)[2]		**41**	**7**	**892**	**892**	**935**	**892**	**698**	**663**	**2,148**	**2,148**	**2,160**	**2,148**	**996**	**340**	**4,168**	**4,168**	**4,121**	**4,168**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	51	NA	NA	51	NA	NA	14	NA	NA	14	NA	NA	221	NA	NA	221
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	14	NA	NA	14	NA	NA	4	NA	NA	4	NA	NA	173	NA	NA	173
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	9	NA	NA	9	NA	NA	3	NA	NA	3	NA	NA	250	NA	NA	250
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	12	NA	NA	12	NA	NA	262	NA	NA	262	NA	NA	504	NA	NA	504
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	271	NA	NA	271
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	35	NA	NA	35	NA	NA	10	NA	NA	10	NA	NA	382	NA	NA	382
NY/NJ	Central Bight, OCS-A 0537		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	173	NA	NA	173
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	197	NA	NA	197
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	283	NA	NA	281
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	190	NA	NA	190
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	187	NA	NA	185
NY/NJ	Hudson North, OCS-A 0544		NA	NA	43	NA	NA	43	NA	NA	12	NA	NA	12	NA	NA	105	NA	NA	103
	TOTAL NY/NJ LEASES		**NA**	**NA**	**422**	**NA**	**NA**	**422**	**NA**	**NA**	**377**	**NA**	**NA**	**377**	**NA**	**NA**	**2,935**	**NA**	**NA**	**2,929**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	14	NA	NA	14	NA	NA	4	NA	NA	4	NA	NA	38	NA	NA	38
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	68	NA	NA	68	NA	NA	19	NA	NA	19	NA	NA	300	NA	NA	300
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	85.68	NA	NA	85.68	NA	NA	24	NA	NA	24	NA	NA	216	NA	NA	216
DE/MD	OCS-A 0519 remainder		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	86	NA	NA	86	NA	NA	24	NA	NA	24	NA	NA	216	NA	NA	216
	TOTAL DE/MD LEASES		NA	NA	**253**	**NA**	**NA**	**253**	NA	NA	**71**	**NA**	**NA**	**71**	NA	NA	**770**	**NA**	**NA**	**770**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	10	NA	NA	10	NA	NA	3	NA	NA	3	NA	NA	5	NA	NA	5
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	42	NA	NA	42	NA	NA	42	NA	NA	42	NA	NA	1781	NA	NA	1781
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	40	NA	NA	40	NA	NA	11	NA	NA	11	NA	NA	166	NA	NA	166
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	71	NA	NA	71	NA	NA	20	NA	NA	20	NA	NA	290	NA	NA	290
	TOTAL VA/NC LEASES		**NA**	**NA**	**163**	**NA**	**NA**	**162**	**NA**	**NA**	**76**	**NA**	**NA**	**76**	**NA**	**NA**	**2242**	**NA**	**NA**	**2242**
	OCS Total (without Proposed Action)[24, 25]:		**41**	**7**	**1,730**	**892**	**935**	**1730**	**698**	**1,326**	**2,672**	**2,148**	**2,160**	**2,672**	**1,008**	**340**	**10,119**	**4,168**	**4,125**	**10,113**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 7)

Region	Lease/Project/ Lease Remainder[1]	Status	Inter-array Operating Footprint/ Seabed Disruption (Acres)[22]						Inter-array Cable Hard Protection (Acres)[23]						Total of Coolant fluids in WTGs (gallons)						
			Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	7.15	NA	7.15	7.15	7.15	7.15	0.00	NA	0.00	0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA
	Total State Waters		**7.15**	**NA**	**7.15**	**NA**	**7.15**	**7.15**	**0.00**	**NA**	**0.00**	**0.00**	**0.00**	**0.00**	NA	NA	NA	NA	NA	NA	NA
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	90	90	90	90	NA	NA	22.491	22.491	22.5	22.491	NA	NA	NA	42,300	42,300	42,300	42,300
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	19	19	19	19	19	19	20.2	20.2	20.2	20.2	20.2	20.2	41208	41208	NA	41208	41208	41208	41208
MA/RI	Sunrise, OCS-A 0487	COP, PPA	145	NA	145	145	145	145	129	NA	129	129	129	129	350,268	350,268	NA	350,268	350,268	350,268	350,268
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	NA	NA	92	92	92	92	NA	NA	129	129	129	129	25,360	NA	NA	314,470	314,470	314,470	314,470
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	NA	NA	117	117	117	117	NA	NA	14	14	14	14	72,277	NA	NA	475,826	475,826	475,826	475,826
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	213	213	213	213	NA	NA	122	122	122	122	NA	NA	NA	73,500	73,500	73,500	73,500
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	152	152	152	152	NA	NA	152	152	152	152	NA	NA	NA				
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)	132.99	NA	160	160	133	160	NA	NA	0	0	0	0							
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	NA	NA	482	482	482	482	NA	NA	0	0	0	0	NA	NA	NA	136,629	136,629	136,629	136,629
MA/RI	OCS-A 0500 remainder[c]		14.3	NA					0	NA					30,033	4,230	NA				
MA/RI	OCS-A 0487 remainder[c]		6	NA					0	NA					1,692	1,692	NA				
MA/RI	OCS-A 0520 remainder		NA	NA					NA	NA					NA	NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	153	0	642	642	615	642	0	NA	0	0	0	0	70,218	33,417	0	183,159	183,159	183,159	183,159
	Total MA/RI Leases (without Proposed Actions)[2]		**317**	**19**	**1,470**	**1,470**	**1,443**	**1,470**	**149**	**20**	**588**	**588**	**589**	**588**	**559,331**	**424,893**	**0**	**1,480,731**	**1,480,731**	**1,480,731**	**1,480,731**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	134	NA	NA	134	NA	NA	0	NA	NA	0	NA	NA	NA	39,690	NA	NA	39,690
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	103	NA	NA	103	NA	NA	0	NA	NA	0	NA	NA	NA	61,912	NA	NA	61912
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	149	NA	NA	149	NA	NA	0	NA	NA	0	NA	NA	NA	89,816	NA	NA	89816
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	317	NA	NA	317	NA	NA	0	NA	NA	0	NA	NA	NA	820,000	NA	NA	820,000
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	162	NA	NA	162	NA	NA	0	NA	NA	0	NA	NA	NA	44,953	NA	NA	44,953
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	239	NA	NA	239	NA	NA	0	NA	NA	0	NA	NA	NA	643,700	NA	NA	643,700
NY/NJ	Central Bight, OCS-A 0537		NA	NA	106	NA	NA	106	NA	NA	0	NA	NA	0	NA	NA	NA	47,790	NA	NA	47,790
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	115	NA	NA	114	NA	NA	0	NA	NA	0	NA	NA	NA	36,450	NA	NA	36,450
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	165	NA	NA	166	NA	NA	0	NA	NA	0	NA	NA	NA	34,020	NA	NA	34,020
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	110	NA	NA	110	NA	NA	0	NA	NA	0	NA	NA	NA	38,475	NA	NA	38,475
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	111	NA	NA	112	NA	NA	0	NA	NA	0	NA	NA	NA	38,070	NA	NA	38,070
NY/NJ	Hudson North, OCS-A 0544		NA	NA	62	NA	NA	63	NA	NA	0	NA	NA	0	NA	NA	NA	25,515	NA	NA	25,515
	TOTAL NY/NJ LEASES		**NA**	**NA**	**1774**	**NA**	**NA**	**1775**	**NA**	NA	**0**	**NA**	**NA**	**0**	**NA**	**NA**	**NA**	**1,920,391**	**NA**	**NA**	**1,920,391**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	24	NA	NA	24	NA	NA	0	NA	NA	0	NA	NA	NA	6,768	NA	NA	6,768
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	184	NA	NA	184	NA	NA	0	NA	NA	0	NA	NA	NA	52,875	NA	NA	52,875

Region	Lease/Project/ Lease Remainder[1]	Status	Inter-array Operating Footprint/ Seabed Disruption (Acres)[22]						Inter-array Cable Hard Protection (Acres)[23]						Total of Coolant fluids in WTGs (gallons)						
			Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	481.91	NA	NA	481.91	NA	NA	0	NA	NA	0	NA	NA	NA	38070	NA	NA	38070
DE/MD	OCS-A 0519 remainder		NA	NA		NA	NA		NA	NA		NA	NA		NA	NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	482	NA	NA	482	NA	NA	0	NA	NA	0	NA	NA	NA	38,070	NA	NA	38070
	TOTAL DE/MD LEASES		NA	NA	**1173**	**NA**	**NA**	**1173**	NA	NA	**0**	**NA**	**NA**	**0**	**NA**	**NA**	**NA**	**135,783**	**NA**	**NA**	**135,783**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	3	NA	NA	3	NA	NA	0	NA	NA	0	NA	NA	NA	846	NA	NA	846
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	297	NA	NA	297	NA	NA	0	NA	NA	0	NA	NA	NA	86,715	NA	NA	86715
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	100	NA	NA	100	NA	NA	0	NA	NA	0	NA	NA	NA	29,187	NA	NA	29,187
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	176	NA	NA	176	NA	NA	0	NA	NA	0	NA	NA	NA	51,183	NA	NA	51,183
	TOTAL VA/NC LEASES		**NA**	**NA**	**576**	**NA**	**NA**	**576**	**NA**	**NA**	**0**	**NA**	**NA**	**0**	**NA**	**NA**	**NA**	**167,931**	**NA**	**NA**	**167931**
	OCS Total (without Proposed Action)[24, 25]:		**324**	**19**	**4,999**	**1,470**	**1,443**	**5,000**	**149**	**20**	**588**	**588**	**589**	**588**	**559,331**	**424,893**	**NA**	**3,704,836**	**1,480,731**	**1,480,731**	**3,704,836**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 8)

Region	Lease/Project/ Lease Remainder[1]	Status	Total Coolant Fluids in ESP/OSP (gallons)							Total of Oils and Lubricants in WTGs (gallons)							Total Oils and Lubricants in ESP/OSP (gallons)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total State Waters		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	46	46	46	46	NA	NA	NA	383,000	383,000	383,000	383,000	NA	NA	NA	123,559	123,559	123,559	123,559
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	27	27	NA	27	27	27	23	69,732	69,732	NA	69,732	69,732	69,732	69,732	80,045	80,045	72,076	80,045	80,045	80,045	80,045
MA/RI	Sunrise, OCS-A 0487	COP, PPA	23	23	NA	23	23	46	23	307,326	307,326	NA	307,326	307,326	307,326	307,326	199,956	199,956	NA	199,956	199,956	199,956	199,956
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	2,113	NA	NA	4,226	4,226	4,226	4,226	82,553	NA	NA	165,106	165,106	165,106	165,106	185,978	NA	NA	371,956	371,956	371,956	371,956
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	3,170	NA	NA	9,510	9,510	9,510	9,510	37,944	NA	NA	249,798	249,798	249,798	249,798	185,978	NA	NA	557,934	557,934	557,934	557,934
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	1,500	1,500	1,500	1,500	NA	NA	NA	433,650	433,650	433,650	433,650	NA	NA	NA	755,000	755,000	755,000	755,000
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA					NA	NA	NA					NA	NA	NA				
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)																					
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected).	NA	NA	NA	322	322	322	322	NA	NA	NA	1,237,090	1,237,090	1,237,090	1,237,090	NA	NA	NA	864,913	864,913	864,913	864,913
MA/RI	OCS-A 0500 remainder[c]		23	23	NA					271,930	38,300	NA					61,780	61,780	NA				
MA/RI	OCS-A 0487 remainder[c]		0	0	NA					15,320	15,320	NA					0	0	NA				

Region	Lease/Project/ Lease Remainder[1]	Status	Total Coolant Fluids in ESP/OSP (gallons)							Total of Oils and Lubricants in WTGs (gallons)							Total Oils and Lubricants in ESP/OSP (gallons)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
MA/RI	OCS-A 0520 remainder	Collectively the remaining technical capacity is 4,764 MW.	NA	NA	NA					NA	NA	NA					NA	NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	92	69	NA	368	368	368	368	635,780	302,570	NA	1,658,390	1,658,390	1,585,620	1,658,390	247,118	185,339	NA	988,472	988,472	247,118	988,472
	Total MA/RI Leases (without Proposed Actions)[2]		**5,425**	**119**	**NA**	**15,700**	**15,700**	**15,723**	**15,696**	**1,133,335**	**679,628**	**NA**	**3,267,002**	**3,267,002**	**3,194,232**	**3,267,002**	**899,075**	**465,340**	**72,076**	**3,076,922**	**3,076,922**	**2,335,568**	**3,076,922**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	NA	0	NA	NA	0	NA	NA	NA	187,964	NA	NA	187,964	NA	NA	NA	238,707	NA	NA	238,707
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	NA	0	NA	NA	0	NA	NA	NA	290,177	NA	NA	290,177	NA	NA	NA	105,669	NA	NA	105,669
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	NA	0	NA	NA	0	NA	NA	NA	420,961	NA	NA	420,961	NA	NA	NA	158,503	NA	NA	158,503
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	NA	10,300	NA	NA	10,300	NA	NA	NA	606,200	NA	NA	606,200	NA	NA	NA	370,050	NA	NA	370,050
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	212,888	NA	NA	212,888	NA	NA	NA	160,732	NA	NA	160,732
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	NA	8,240	NA	NA	8240	NA	NA	NA	475,867	NA	NA	475,867	NA	NA	NA	296,040	NA	NA	296,040
NY/NJ	Central Bight, OCS-A 0537		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	226,324	NA	NA	226,324	NA	NA	NA	287,423	NA	NA	287,423
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	172,620	NA	NA	172,620	NA	NA	NA	219,221	NA	NA	219,221
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	161,112	NA	NA	161,112	NA	NA	NA	204,606	NA	NA	204,606
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	182,210	NA	NA	182,210	NA	NA	NA	231,400	NA	NA	231,400
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	180,292	NA	NA	180,292	NA	NA	NA	228,964	NA	NA	228,964
NY/NJ	Hudson North, OCS-A 0544		NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	120,834	NA	NA	120,834	NA	NA	NA	153,455	NA	NA	153,455
	TOTAL NY/NJ LEASES		**NA**	**NA**	**NA**	**18,540**	**NA**	**NA**	**18,540**	**NA**	**NA**	**NA**	**3,237,449**	**NA**	**NA**	**3,237,449**	**NA**	**NA**	**NA**	**2,654,770**	**NA**	**NA**	**2,654,770**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	NA	46	NA	NA	46	NA	NA	NA	61,280	NA	NA	61,280	NA	NA	NA	61,780	NA	NA	61,780
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	NA	184	NA	NA	184	NA	NA	NA	478,750	NA	NA	478,750	NA	NA	NA	247,118	NA	NA	247,118
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.	NA	NA	NA	322	NA	NA	322	NA	NA	NA	344700	NA	NA	344700	NA	NA	NA	185338.5	NA	NA	185338.5
DE/MD	OCS-A 0519 remainder		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA	
	Remaining DE/MD Lease Area Total		NA	NA	NA	69	NA	NA	69	NA	NA	NA	344,700	NA	NA	344,700	NA	NA	NA	185,339	NA	NA	185338.5
	TOTAL DE/MD LEASES		**NA**	**NA**	**NA**	**621**	**NA**	**NA**	**621**	**NA**	**NA**	**NA**	**1,229,430**	**NA**	**NA**	**1,229,430**	**NA**	**NA**	**NA**	**679,575**	**NA**	**NA**	**679,575**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	NA	0	NA	NA	0	NA	NA	NA	7,660	NA	NA	7660	NA	NA	NA	0	NA	NA	0
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	NA	69	NA	NA	69	NA	NA	NA	785,150	NA	NA	785150	NA	NA	NA	185,339	NA	NA	185338.5
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	NA	23	NA	NA	23	NA	NA	NA	264,270	NA	NA	264,270	NA	NA	NA	61,780	NA	NA	61,780
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	NA	46	NA	NA	46	NA	NA	NA	463,430	NA	NA	463,430	NA	NA	NA	123,559	NA	NA	123,559
	TOTAL VA/NC LEASES		**NA**	**NA**	**NA**	**138**	**NA**	**NA**	**138**	**NA**	**NA**	**NA**	**1,520,510**	**NA**	**NA**	**1520510**	**NA**	**NA**	**NA**	**370,677**	**NA**	**NA**	**370677**
	OCS Total (without Proposed Action)[24, 25]:		**5,425**	**119**	**NA**	**34,999**	**15,700**	**15,723**	**34,995**	**1,133,335**	**679,628**	**NA**	**9,254,391**	**3,267,002**	**3,194,232**	**9,254,391**	**899,075**	**465,340**	**72,076**	**6,781,944**	**3,076,922**	**2,335,568**	**6,781,944**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 9)

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)							Total Diesel Fuel in ESP/OSP (gallons)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total State Waters		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	79,300	79,300	79,300	79,300	NA	NA	NA	5,696	5,696	5,696	5,696
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	9,516	9,516	9,516	9,516	9,516	9,516	9,516	52,834	52,834	52,834	52,834	52,834	52,834	52,834
MA/RI	Sunrise, OCS-A 0487	COP, PPA	80,886	80,886	NA	80,886	80,886	80,886	80,886	24,304	24,304	NA	24,304	24,304	24,304	24,304
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	49,135	NA	NA	98,271	98,271	98,271	98,271	5,467	NA	NA	10,935	10,935	10,935	10,935
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	22,190	NA	NA	146,087	146,087	146,087	146,087	8,201	NA	NA	24,604	24,604	24,604	24,604
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	NA	NA	NA	132,300	132,300	132,300	132,300	NA	NA	NA	200,000	200,000	200,000	200,000
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	NA	NA	NA					NA	NA	NA				
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)								NA	NA	NA	105,668	105,668	105,668	105,668
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.	NA	NA	NA	256,139	256,139	256,139	256,139	NA	NA	NA	39,872	39,872	39,872	39,872
MA/RI	OCS-A 0500 remainder[c]		56,303	7,930	NA					5,696	5,696	NA				
MA/RI	OCS-A 0487 remainder[c]		3,172	3,172	NA					0	0	NA				
MA/RI	OCS-A 0520 remainder		NA	NA	NA					NA	NA	NA				
	Remaining MA/RI Lease Area Total[2]	88%	131,638	62,647	0	343,369	343,369	328,302	343,369	11,392	8,544	NA	145,540	145,540	145,540	145,540
	Total MA/RI Leases (without Proposed Actions)[2]		**293,365**	**153,049**	**9,516**	**889,729**	**889,729**	**874,662**	**889,729**	**102,198**	**91,378**	**52,834**	**463,913**	**463,913**	**463,913**	**463,913**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	NA	NA	NA	77,714	NA	NA	77,714	NA	NA	NA	158,502	NA	NA	158,502
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA	NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	105,673	NA	NA	105,673
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA	NA	NA	NA	n.d.	NA	NA	n.d.	NA	NA	NA	6,604	NA	NA	6,604
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA	NA	NA	NA	80,000	NA	NA	80,000	NA	NA	NA	75,000	NA	NA	75,000
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA	NA	NA	NA	88,019	NA	NA	88019	NA	NA	NA	105,673	NA	NA	105673
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)		NA	NA	NA	62,800	NA	NA	62,800	NA	NA	NA	60,000	NA	NA	60,000
NY/NJ	Central Bight, OCS-A 0537		NA	NA	NA	93,574	NA	NA	93,574	NA	NA	NA	190,849	NA	NA	190,849
NY/NJ	Hudson South B, OCS-A 0538		NA	NA	NA	71,370	NA	NA	71,370	NA	NA	NA	145,563	NA	NA	145,563
NY/NJ	Hudson South C, OCS-A 0539		NA	NA	NA	66,612	NA	NA	66,612	NA	NA	NA	135,859	NA	NA	135,859
NY/NJ	Hudson South E, OCS-A 0541		NA	NA	NA	75,335	NA	NA	75,335	NA	NA	NA	153,650	NA	NA	153,650
NY/NJ	Hudson South F, OCS-A 0542		NA	NA	NA	74,542	NA	NA	74,542	NA	NA	NA	152,033	NA	NA	152,033
NY/NJ	Hudson North, OCS-A 0544		NA	NA	NA	49,959	NA	NA	49,959	NA	NA	NA	101,894	NA	NA	101,894
	TOTAL NY/NJ LEASES		**NA**	**NA**	**NA**	**739,925**	**NA**	**NA**	**739,925**	**NA**	**NA**	**NA**	**1,391,300**	**NA**	**NA**	**1,391,300**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	NA	NA	NA	12,688	NA	NA	12,688	NA	NA	NA	2,848	NA	NA	2,848
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	NA	NA	NA	99,125	NA	NA	99,125	NA	NA	NA	11,392	NA	NA	11,392
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The	NA	NA	NA	71370	NA	NA	71370	NA	NA	NA	8544	NA	NA	8544
DE/MD	OCS-A 0519 remainder		NA	NA	NA		NA	NA		NA	NA	NA		NA	NA	

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)							Total Diesel Fuel in ESP/OSP (gallons)						
			Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice	Air	Water	Benthic/Cultural Resources	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Land-Use	Navigation/ Commercial Fisheries/Other Uses	Visual/Recreation-Tourism	Demographics/ Environmental Justice
		remaining capacity may be utilized by demand from NJ or MD.														
	Remaining DE/MD Lease Area Total		NA	NA	NA	71,370	NA	NA	71370	NA	NA	NA	8,544	NA	NA	8544
	TOTAL DE/MD LEASES		**NA**	**NA**	**NA**	**254,553**	**NA**	**NA**	**254,553**	**NA**	**NA**	**NA**	**31,328**	**NA**	**NA**	**31,328**
VA/NC	CVOW, OCS-A 0497	Built	NA	NA	NA	1,586	NA	NA	1586	NA	NA	NA	0	NA	NA	0
VA/NC	CVOW-C, OCS-A 0483	COP	NA	NA	NA	162,565	NA	NA	162565	NA	NA	NA	8,544	NA	NA	8544
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	NA	NA	NA	54,717	NA	NA	54,717	NA	NA	NA	2,848	NA	NA	2,848
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)	NA	NA	NA	95,953	NA	NA	95,953	NA	NA	NA	5,696	NA	NA	5,696
	TOTAL VA/NC LEASES		**NA**	**NA**	**NA**	**314,821**	**NA**	**NA**	**314821**	**NA**	**NA**	**NA**	**17,088**	**NA**	**NA**	**17088**
	OCS Total (without Proposed Action)[24, 25]:		**293,365**	**153,049**	**9,516**	**314,821**	**889,729**	**874,662**	**2,199,028**	**102,198**	**91,378**	**52,834**	**1,903,629**	**463,913**	**463,913**	**1,903,629**

Table E3-1. Offshore Wind Leasing Activities in the U.S. East Coast: Projects and Assumptions (as of February 1, 2022) (part 10)

Region	Lease/Project/ Lease Remainder[1]	Status	Construction Emissions NOx (tons)	Construction Emissions VOC (tons)	Construction Emissions CO (tons)	Construction Emissions PM10 (tons)	Construction Emissions PM2.5 (tons)	Construction Emissions SO2 (tons)	Construction Emissions CO2 (tons)	Operation Emissions NOx (tpy)	Operation Emissions VOC (tpy)	Operation Emissions CO (tpy)	Operation Emissions PM10 (tpy)	Operation Emissions PM2.5 (tpy)	Operation Emissions SO2 (tpy)	Operation Emissions CO2 (tpy)
			Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
NE	NE Aquaventus (state waters)	State Project	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NE	Block Island (state waters)	State Project, Built	585.96	25.73	101.16	37.15	NA	0.424	42,940.00	21.40	0.80	2.80	1.40	NA	0.01	1,572.00
	Total State Waters		**585.96**	**25.73**	**101.16**	**37.15**	**NA**	**0.424**	**42,940.00**	**21.40**	**0.80**	**2.80**	**1.40**	**NA**	**0.01**	**1,572.00**
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA, ROD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MA/RI	South Fork, OCS-A 0517	COP, PPA, ROD	1,451	59	284	49	47	33	97,026	281	6	58	10	10	2	18,894
MA/RI	Sunrise, OCS-A 0487	COP, PPA	5,876	138	2,441	108	108	6	637,986	590	14	246	11	11	1	64,145
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])[a]	COP, PPA	237.80	5.61	98.79	4.39	4.39	2.73	30,627.80	31.21	0.55	7.65	1.06	0.98	0.10	2,665.08
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	COP	1,255.64	26.73	292.36	50.36	48.73	7.45	85,811.09	76.18	1.35	18.55	2.55	2.36	0.24	7,704.73
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA														
MA/RI	Beacon Wind, part of OCS-A 0520	PPA														
MA/RI	Bay State Wind, part of OCS-A 0500	SAP (the MW of this proposed project is included in the description below)														
MA/RI	Liberty Wind (OCS-A 0522)	This group is exposed to 4,200 MW of demand--for MA (2,400 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,764 MW.														
MA/RI	OCS-A 0500 remainder[c]															
MA/RI	OCS-A 0487 remainder[c]															
MA/RI	OCS-A 0520 remainder															
	Remaining MA/RI Lease Area Total[2]	88%	16,388.00	401.00	3,686.00	569.00	547.00	127.00	1,052,650.00	234.00	7.00	60.00	8.00	8.00	1.00	18,126.00
	Total MA/RI Leases (without Proposed Actions)[2]		**17,881.44**	**433.33**	**4,077.15**	**623.76**	**600.12**	**137.18**	**1,169,088.89**	**341.39**	**8.90**	**86.20**	**11.61**	**11.35**	**1.33**	**28,495.80**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA														

Region	Lease/Project/ Lease Remainder[1]	Status	Construction Emissions NOx (tons)	Construction Emissions VOC (tons)	Construction Emissions CO (tons)	Construction Emissions PM10 (tons)	Construction Emissions PM2.5 (tons)	Construction Emissions SO2 (tons)	Construction Emissions CO2 (tons)	Operation Emissions NOx (tpy)	Operation Emissions VOC (tpy)	Operation Emissions CO (tpy)	Operation Emissions PM10 (tpy)	Operation Emissions PM2.5 (tpy)	Operation Emissions SO2 (tpy)	Operation Emissions CO2 (tpy)
			Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, PPA														
NY/NJ	Empire Wind 2, part of OCS-A 512	PPA														
NY/NJ	Atlantic Shores OCS-A 0499	COP,PPA														
NY/NJ	Ocean Wind 2, part of OCS-A 0532	PPA														
NY/NJ	Atlantic Shores North, part of OCS-A 0499 (remainder)															
NY/NJ	Central Bight, OCS-A 0537															
NY/NJ	Hudson South B, OCS-A 0538															
NY/NJ	Hudson South C, OCS-A 0539															
NY/NJ	Hudson South E, OCS-A 0541															
NY/NJ	Hudson South F, OCS-A 0542															
NY/NJ	Hudson North, OCS-A 0544															
	TOTAL NY/NJ LEASES															
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA														
DE/MD	US Wind, part of OCS-A 0490	COP, PPA														
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.														
DE/MD	OCS-A 0519 remainder															
	Remaining DE/MD Lease Area Total															
	TOTAL DE/MD LEASES															
VA/NC	CVOW, OCS-A 0497	Built														
VA/NC	CVOW-C, OCS-A 0483	COP														
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP														
VA/NC	Kitty Hawk Wind South, OCS-A 0508 remainder	(pre-COP)														
	TOTAL VA/NC LEASES															
	OCS Total (without Proposed Action)[24, 25]:		**17,881.44**	**433.33**	**4,077.15**	**623.76**	**600.12**	**137.18**	**1,169,088.89**	**341.39**	**8.90**	**86.20**	**11.61**	**11.35**	**1.33**	**28,495.80**

1. The spacing/layout for projects/regions are as follows: NE State water projects include a single strand of WTGs and no OSSs; for projects in the RI and MA Lease Areas, a 1 × 1–nm grid spacing is assumed; for the projects in the New Jersey/New York and the Delaware/Maryland lease areas, BOEM assumes that a 1 × 1–nm grid spacing also would be utilized; for the Coastal Virginia Offshore Wind Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1 × 1–nm spacing due to the need to attain the state's goals.

2. Because development could occur anywhere within the RI and MA Lease Areas and assumes a continuous 1 x 1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the cumulative scenario described in in this appendix (Appendix E), the total area in the RI and MA Lease Areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.

3. This column identifies lease areas that are applicable to each resource based on the geographic analysis areas shown in the EIS.

4. The estimated construction schedules are for offshore components only. Onshore construction could begin sooner. The estimated dates are based on information as of February 1, 2022, and are subject to change when an applicant submits a COP or as project COPs progress through the approval process. Furthermore, BOEM assumes that construction of all the foundations would be installed during year 1 of a given project's construction schedule with the remaining work completed in year 2.

5. It is difficult to accurately predict future technology for planned but currently unscheduled offshore wind awards, including turbine spacing and capacity. For those projects without announced WTG sizes, BOEM used the assumption of an 8- or 12-MW WTG based on maximum-impact case for the resource. BOEM understands that it is feasible that in the future, turbine capacity could be greater than 12 MW. For future procurements and projects under this cumulative analysis, BOEM assumes a 12-MW WTG, to evaluate potential impacts.

6. The air quality geographic analysis area includes 100% of SFWF, SRWF, OCS-A 0487 remainder, and OCS-A 0486 remainder; 70% of Bay State Wind Project, 77% of OCS-A 0500 remainder; 4% of Park City Wind; and 10% of Commonwealth Wind.

7. The water quality geographic analysis area includes 100% of SFWF, OCS-A 0487 remainder, and OCS-A 0486 remainder; 90% SRWF; 46% Bay State Wind Project; and 30% of OCS-A 0500 remainder. While a small portion of Lease OCS-A 0482 overlaps with the water quality GAA spatially, the construction activities associated with this lease are not expected to overlap temporarily with activities for Revolution Wind. Given the lack of temporal overlap of construction activities, and because all other fluids and discharges associated with O&M are expected to be marginal, this lease was not factored into the water quality geographic analysis area estimates for Revolution Wind.

8. BOEM assumes that each offshore wind development would have its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line. The length of offshore export cable for those lease areas without a known project size has been assumed to include two offshore cables totaling 120 miles (193 kilometers). The offshore export cable would be buried a minimum of 6 feet (1.8 meters) but not more than 10 feet (3.1 meters).

[9.] The length of inter-array cabling has been assumed for all lease areas, except the SFWF, SRWF, and Vineyard Wind 1 which have been calculated by the applicant, to be the average amount per foundation based on the COPs submitted to date, which is 1.48 miles (2.4 kilometers). In addition, for those lease areas that require more than one OSS, it has been assumed that an additional 6.2 miles (9.9 kilometers) of inter-link cable would be required to link the two OSSs. Inter-array cable is assumed to be buried between 4 and 6 feet.

[10.] The hub height for lease areas is based on the most-impactful-case scenario for the resource area.

[11.] The rotor diameter for lease areas is based on the most-impactful-case scenario for the resource area.

[12.] The total height of the turbine for lease areas is based on the most-impactful-case scenario for the resource area.

[13.] The number of turbines for those lease areas without a known project size has been calculated based on the generating capacity and a 12-MW turbine.

[14.] The estimated number of foundations is the total number of turbines plus OSSs, and it has been assumed that for every 50 turbines there would be one OSS installed. There are some exceptions to this assumption where additional relevant information is available in publicly available COPs for future projects.

[15.] The foundation footprint has been assumed to be 0.1 acre per turbine, which is based on the largest monopile reported (12 MW) for all lease areas other than the SFWF, SRWF, New England Wind Phases 1 and 2, and Vineyard Wind 1, which have been calculated by the applicant or by using the information available in the COP for each project.

[16.] The seabed disturbance with the addition of scour protection was calculated based on scour protection expected in submitted COPs. It is assumed that for all lease areas that a 12-MW foundation with addition of scour protection would be 1.0 acre per foundation other than SFWF, SRWF, and Vineyard Wind 1, which have been calculated by the applicant or by using the information available in the COP for each project.

[17.] Offshore export cable seabed bottom disturbance is assumed to be due to installation of the export cable, the use of jack-up vessels, the need to perform dredging, and boulder removal. If information for a future project could not be obtained from a publicly available COP, export cable seabed disturbance assumed to be 1.25 acres per mile.

[18.] If information for a future project could not be obtained from a publicly available COP, the offshore export cable operating seabed footprint assumed to be 0.4 acre per mile

[19.] For projects other than the SFWF, SRWF, and New England Wind Phases 1 and 2, which have been calculated by the applicant, the offshore export cable hard protection is assumed to be similar to Vineyard Wind 1 Project, which is 0.357 acre (1.445 square meters [m^3]) per mile of offshore export cable with up to 10% of the offshore export cable requiring protection.

[20.] Anchoring disturbance for the SFWF and New England Wind Phases 1 and 2 has been calculated by the applicant. Anchoring disturbance for other lease areas has been assumed to be a rate equal to 0.10 acres (405 m^3) per mile of offshore export cable, with the exception of Vineyard Wind 1 Project, which is 0.044 acres per mile of offshore export cable.

[21.] Inter-array construction seabed disturbance for the SFWF, New England Wind Phases 1 and 2, and CVOW-C has been calculated by the applicant. Inter-array construction seabed disturbance for other lease areas has been assumed to be a rate equal to the average area per foundation, 2.4 acres (9.712 m^3) per foundation, with the exception of Vineyard Wind 1 Project, which is 2.04 acres (8.256 m^3) per foundation.

[22.] The inter-array operating footprint for the SFWF has been calculated by the applicant. The inter-array operating footprint for other lease areas is assumed to be a rate equal to the average amount per foundation of 1.43 acres (5.787 m^3) per foundation for all other lease areas.

[23.] Inter-array cable hard protection for Vineyard Wind 1, SFWF, SRWF, New England Wind Phases 1 and 2, and Mayflower have been calculated by the applicant. The inter-array cable hard protection for other lease areas is assumed to be zero.

[24.] BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts. Totals by lease area and by OCS may not fully sum due to rounding errors.

[25.]. New York's demand is not double-counted, this total comes from looking at New York's state demand, not adding up the potential of the areas because that would double-count New York.

[a.] Emissions values represent 4% of the total for Park City Wind, as only 4% of the proposed development lies within the geographic scope of direct impacts from the proposed action.

[b.] Emissions values represent 10% of the total for Common Wealth Wind, as only 10% of the proposed development lies within the geographic scope of direct impacts from the proposed action

[c.] Emissions estimated by taking the average for each pollutant per foundation for the Vineyard Wind 1 (13-MW turbine) COP and multiplying by the number of foundations in remainder/unspecified area within air quality GAA.

Literature Cited

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf*. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed December 2020.

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APPENDIX E4

Maximum-Case Scenario Estimates for Select Offshore Wind Project Components

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Tables

Table E4-1. Maximum-Case Scenario Estimates of Potential Impacts for Specific Offshore Wind Project Components E4-3

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Introduction

The following table provides maximum-case scenario estimates of potential No Action, Proposed Action, and other action alternative impacts for specific offshore wind project components, assuming maximum buildout, using the geographic analysis areas in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) project environmental impact statement (EIS) and cumulative estimates developed by Bureau of Ocean Energy Management BOEM (see Table E3-1 in Appendix E3). All numbers are estimates and subject to change.

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Table E4-1. Maximum-Case Scenario Estimates of Potential Impacts for Specific Offshore Wind Project Components

Project Component	Geographic Analysis Area	OCS Total (without Proposed Action)	Proposed Action	Alt C	Alt D	Alt E	Alt F	Proposed Action + OCS Total (Cumulative)	Alt C + OCS Total (Cumulative)	Alt D + OCS Total (Cumulative)	Alt E + OCS Total (Cumulative)	Alt F + OCS Total (Cumulative)
Offshore export cable length (statute miles)	**All**	4,921	84	84[Ŧ]	84[Ŧ]	84[Ŧ]	84[Ŧ]	5,005	5,005[Ŧ]	5,005[Ŧ]	5,005[Ŧ]	5,005[Ŧ]
Inter-array cable and OSS-link cable length (statute miles)	**All**	5,103	164	164[Ŧ]	164[Ŧ]	164[Ŧ]	164[Ŧ]	5,258	5,267[Ŧ]	5,267[Ŧ]	5,267[Ŧ]	5,267[Ŧ]
WTG number	**Air**	371	100	64–65	78–93	64 or 81	56	471	435–436	449–464	435 or 452	427
	Water	200	100	64–65	78–93	64 or 81	56	300	264–265	278–293	264 or 281	256
	Benthic/cultural resources	12	100	64–65	78–93	64 or 81	56	112	76–77	90–105	76 or 93	68
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	2,932	100	64–65	78–93	64 or 81	56	3,032	2,996–2,997	3,010–3,025	2,996 or 3,013	2,988
	Navigation/ commercial fisheries/other uses	1,007	100	64–65	78–93	64 or 81	56	1,107	1,071–1,072	1,085–1,100	1,071 or 1,088	1,063
	Visual/recreation-tourism	936	100	64–65	78–93	64 or 81	56	1,036	1,000–1,001	1,014–1,029	1,000 or 1,017	992
	Demographics/ environmental justice	2,932	100	64–65	78–93	64 or 81	56	3,032	2,996–2,997	3,010–3,025	2,996 or 3,013	2,988
Foundation number (WTG and OSS)	**Air**	380	102	66–67	80–95	66 or 83	58	482	446–447	460–475	446 or 463	438
	Water	205	102	66–67	80–95	66 or 83	58	307	271–272	285–300	271 or 288	263
	Benthic/cultural resources	13	102	66–67	80–95	66 or 83	58	115	79–80	93–108	79 or 96	71
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	3,008	102	66–67	80–95	66 or 83	58	3,110	3,074–3,075	3,088–3,103	3,074 or 3,091	3,066
	Navigation/ commercial fisheries/other uses	1,036	102	66–67	80–95	66 or 83	58	1,138	1,102–1,103	1,116–1,131	1,102 or 1,119	1,094
	Visual/recreation-tourism	953	102	66–67	80–95	66 or 83	58	1,055	1,019–1,020	1,033–1,048	1,019 or 1,036	1,011
	Demographics/ environmental justice	3,008	102	66–67	80–95	66 or 83	58	3,110	3,074–3,075	3,088–3,103	3,074 or 3,091	3,066
Operation footprint of foundations (WTG and OSS) (acres)	**Air**	23	3	2	2–3	2	2	26	25	25–26	25	25
	Water	12	3	2	2–3	2	2	15	14	14–15	14	14
	Benthic/cultural resources	1	3	2	2–3	2	2	4	3	3–4	3	3
	Birds/bats/finfish-invertebrates-efh/marine mammals/sea turtles/land-use	403	3	2	2–3	2	2	406	405	405–406	405	405

Project Component	Geographic Analysis Area	OCS Total (without Proposed Action)	Proposed Action	Alt C	Alt D	Alt E	Alt F	Proposed Action + OCS Total (Cumulative)	Alt C + OCS Total (Cumulative)	Alt D + OCS Total (Cumulative)	Alt E + OCS Total (Cumulative)	Alt F + OCS Total (Cumulative)
	Navigation/ commercial fisheries/other uses	199	3	2	2–3	2	2	202	201	201–202	201	201
	Visual/recreation-tourism	190	3	2	2–3	2	2	193	192	192–193	192	192
	Demographics/ environmental justice	403	3	2	2–3	2	2	406	405	405–406	405	405
Construction footprint of foundations (WTG and OSS) (acres)	**Air**	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Water	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Benthic/cultural resources	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Navigation/ commercial fisheries/other uses	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Visual/recreation-tourism	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
	Demographics/ environmental justice	Not available	734.4	475.2–482.4	576–684	475.2–597.6	417.6	Not available	Not available	Not available	Not available	Not available
Operation footprint of scour protection at foundations (foundation + scour protection) (acres)	**Air**	394	71.4	46–47	56–67	46–58	41	465.4	440–441	450–461	440 or 452	435
	Water	201	71.4	46–47	56–67	46–58	41	272.4	247–248	257–268	247 or 259	242
	Benthic/cultural resources	11	71.4	46–47	56–67	46–58	41	82.4	57–58	67–78	57 or 69	52
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	5,883	71.4	46–47	56–67	46–58	41	5,954.4	5,929–5,930	5,939–5,950	5,929 or 5,941	5,924
	Navigation/ commercial fisheries/other uses	2,753	71.4	46–47	56–67	46–58	41	2,824.4	2,799–2,800	2,809–2,820	2,799 or 2,811	2,794
	Visual/recreation-tourism	2,670	71.4	46–47	56–67	46–58	41	2,741.4	2,716–2,717	2,726–2,737	2,716 or 2,728	2,711
	Demographics/ environmental justice	5,883	71.4	46–47	56–67	46–58	41	5,954.4	5,929–5,930	5,939–5,950	5,929 or 5,941	5,924
Offshore export cable seabed disturbance (acres)	**Water**	2,126	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	3,516	3,516[Ŧ]	3,516[Ŧ]	3,516[Ŧ]	3,516[Ŧ]
	Benthic/cultural resources	555	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,945	1,945[Ŧ]	1,945[Ŧ]	1,945[Ŧ]	1,945[Ŧ]
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	10,954	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	12,344	12,344[Ŧ]	12,344[Ŧ]	12,344[Ŧ]	12,344[Ŧ]

Project Component	Geographic Analysis Area	OCS Total (without Proposed Action)	Proposed Action	Alt C	Alt D	Alt E	Alt F	Proposed Action + OCS Total (Cumulative)	Alt C + OCS Total (Cumulative)	Alt D + OCS Total (Cumulative)	Alt E + OCS Total (Cumulative)	Alt F + OCS Total (Cumulative)
	Navigation/ commercial fisheries/other uses	5,880	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	7,270	7,270[Ŧ]	7,270[Ŧ]	7,270[Ŧ]	7,270[Ŧ]
	Visual/recreation-tourism	6,023	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	7,413	7,413[Ŧ]	7,413[Ŧ]	7,413[Ŧ]	7,413[Ŧ]
	Demographics/ environmental justice	10,954	1,390	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	1,390[Ŧ]	12,344	12,344[Ŧ]	12,344[Ŧ]	12,344[Ŧ]	12,344[Ŧ]
Offshore export cable hard protection (acres)	**Water**	41	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	201	201[Ŧ]	201[Ŧ]	201[Ŧ]	201[Ŧ]
	Benthic/cultural resources	7	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	167	167[Ŧ]	167[Ŧ]	167[Ŧ]	167[Ŧ]
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	1,730	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	1,890	1,890[Ŧ]	1,890[Ŧ]	1,890[Ŧ]	1,890[Ŧ]
	Navigation/ commercial fisheries/other uses	892	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	1,052	1,052[Ŧ]	1,052[Ŧ]	1,052[Ŧ]	1,052[Ŧ]
	Visual/recreation-tourism	935	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	1,095	1,095[Ŧ]	1,095[Ŧ]	1,095[Ŧ]	1,095[Ŧ]
	Demographics/ environmental justice	1,730	160	160[Ŧ]	160[Ŧ]	160[Ŧ]	160[Ŧ]	1,890	1,890[Ŧ]	1,890[Ŧ]	1,890[Ŧ]	1,890[Ŧ]
Anchoring disturbance (acres)	**Water**	698	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	3,876	2,760–2,791	3,194–3,659	2,760 or 3,287	2,512
	Benthic/cultural resources	1,326	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	4,504	3,388–3,419	3,822–4,287	3,388 or 3,915	3,140
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	2,672	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	5,850	4,734–4,765	5,168–5,633	4,734 or 5,261	4,486
	Navigation/ commercial fisheries/other uses	2,148	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	5,326	4,210–4,241	4,644–5,109	4,210 or 4,737	3,962
	Visual/recreation-tourism	2,160	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	5,338	4,222–4,253	4,656–5,121	4,222 or 4,749	3,974
	Demographics/environmental justice	2,672	3,178	2,062–2,093	2,496–2,961	2,062 or 2,589	1,814	5,850	4,734–4,765	5,168–5,633	4,734 or 5,261	4,486
Inter-array cable and oss-link cable seabed disturbance (acres)	**Water**	1,008	2,619	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	3,627	3,627[Ŧ]	3,627[Ŧ]	3,627[Ŧ]	3,627[Ŧ]
	Benthic/cultural resources	340	2,619	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,959	2,959[Ŧ]	2,959[Ŧ]	2,959[Ŧ]	2,959[Ŧ]
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	10,119	2,619	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	12,738	12,738[Ŧ]	12,738[Ŧ]	12,738[Ŧ]	12,738[Ŧ]
	Navigation/ commercial fisheries/other uses	4,168	2,619	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	6,787	6,787[Ŧ]	6,787[Ŧ]	6,787[Ŧ]	6,787[Ŧ]
	Visual/recreation-tourism	4,125	2,619	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	2,619[Ŧ]	6,744	6,744[Ŧ]	6,744[Ŧ]	6,744[Ŧ]	6,744[Ŧ]

Project Component	Geographic Analysis Area	OCS Total (without Proposed Action)	Proposed Action	Alt C	Alt D	Alt E	Alt F	Proposed Action + OCS Total (Cumulative)	Alt C + OCS Total (Cumulative)	Alt D + OCS Total (Cumulative)	Alt E + OCS Total (Cumulative)	Alt F + OCS Total (Cumulative)
	Demographics/ environmental justice	10,113	2,619	2,619[ŦŦ]	2,619[ŦŦ]	2,619[ŦŦ]	2,619[ŦŦ]	12,732	12,732[ŦŦ]	12,732[ŦŦ]	12,732[ŦŦ]	12,732[ŦŦ]
Inter-array cable and oss-link cable hard protection (acres)	**Water**	149	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	235	235[ŦŦ]	235[ŦŦ]	235[ŦŦ]	235[ŦŦ]
	Benthic/cultural resources	29	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	115	115[ŦŦ]	115[ŦŦ]	115[ŦŦ]	115[ŦŦ]
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	588	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	674	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]
	Navigation/commercial fisheries/other uses	588	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	674	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]
	Visual/recreation-tourism	589	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	675	675[ŦŦ]	675[ŦŦ]	675[ŦŦ]	675[ŦŦ]
	Demographics/ environmental justice	588	85.6	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	85.6[ŦŦ]	674	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]	674[ŦŦ]
Total hazardous fluids (WTG and OSS) (gallons)	**Air**	2,992,729	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	4,010,535	3,739,455–3,746,985	3,844,875–3,957,825	3,739,455 or 3,867,465	3,679,215
	Water	1,814,407	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	2,832,213	2,561,133–2,568,663	2,666,553–2,779,503	2,561,133 or 2,689,143	2,500,893
	Benthic/cultural resources	134,426	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	1,152,232	881,152–888,682	986,572–1,099,522	881,152 or 1,009,162	820,912
	Birds/bats/finfish-invertebrates-EFH/marine mammals/sea turtles/land-use	18,289,598	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	19,307,404	19,036,324–19,043,854	19,141,744–19,254,694	19,036,324 or 19,164,334	18,976,084
	Navigation/ commercial fisheries/other uses	9,193,997	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	10,211,803	9,940,723–9,948,253	10,046,143–10,159,093	9,940,723 or 10,068,733	9,880,483
	Visual/recreation-tourism	8,364,829	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	9,382,635	9,111,555–9,119,085	9,216,975–9,329,925	9,111,555 or 9,239,565	9,051,315
	Demographics/ environmental justice	23,878,823	1,017,806	746,726–754,256	852,146–965,096	746,726–874,736	686,486	24,896,629	24,625,549–24,633,079	24,730,969–24,843,919	24,625,549 or 24,753,559	24,565,309

[ŦŦ] Project design has not occurred for Alternatives C through F; therefore, GIS calculations for the IAC, OSS-link cable, and RWEC are not available. This table uses the Proposed Action as the most conservative proxy estimate. However, best professional judgment suggests that the footprint of the IAC, OSS-link cable, and RWEC would change and be slightly reduced to match the reduced number of WTGs under Alternatives C through F.

Literature Cited

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf*. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed December 2020.

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APPENDIX F

Environmental Protection Measures, Mitigation, and Monitoring

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Introduction

The Revolution Wind Farm (RWF) and the Revolution Wind Export Cable (RWEC) Project environmental impact statement (EIS) assesses the potential environmental, social, economic, historical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and decommissioning of a wind energy project (the Project) located in the Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0486, approximately 15.0 miles east of Block Island, Rhode Island; approximately 12.5 miles south of the Rhode Island mainland coast; and between approximately 12.0 and 13.5 miles southeast of various points along the Massachusetts coastline in the Atlantic Ocean. The Project comprises the siting and development of the RWF and the RWEC. Revolution Wind, LLC (Revolution Wind) is proposing the Project, which is designed to contribute to Connecticut's renewable energy mandate of 2,000 megawatts (MW) of offshore wind energy by 2030 and Rhode Island's 100% renewable energy goal by 2030.

As part of the Project, Revolution Wind has committed to self-implement measures to avoid, reduce, mitigate, and/or monitor impacts on the resources discussed in Chapter 3 of the EIS. Those environmental protection measures (EPMs) are summarized in Table F-1 of this appendix. BOEM considers as part of the Proposed Action only those measures that Revolution Wind has committed to in the construction and operations plan (COP) (vhb 2022). BOEM may select alternatives and/or require additional mitigation or monitoring measures to further protect and monitor these resources. Additional mitigation and monitoring measures may result from reviews under several environmental statutes (Clean Air Act, Endangered Species Act [ESA], Magnuson-Stevens Fisheries Conservation and Management Act, Marine Mammal Protection Act [MMPA], and National Historic Preservation Act), as discussed in Appendix A of the EIS. Additional mitigation measures identified by BOEM, as well as those that may result from reviews under these statutes, are shown in Table F-2. Please note that not all of these mitigation measures are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities. Table F-2 provides descriptions of these mitigation or monitoring measures as well as those that BOEM has identified for analysis in the EIS.

If BOEM decides to approve the COP, the ROD would state which of the mitigation and monitoring measures identified by BOEM in Table F-2 have been adopted, and if not, why. Thus, the ROD would inform terms and conditions of COP approval and would compel compliance with or execution of identified mitigation and monitoring measures (40 CFR 1505.3). Revolution Wind would be required to certify compliance with certain terms and conditions, as required under 30 CFR 585.633(b). Furthermore, BOEM would periodically review the activities conducted under the approved COP. The frequency and extent of the review would be based on the significance of any changes in available information and on onshore or offshore conditions affecting, or affected by, the activities conducted under the COP. If the review indicated that the COP should be revised or amended to meet the requirement of BOEM's renewable energy regulations, Revolution Wind would be required to submit the needed revisions (30 CFR 585.634(b)).

Monitoring measures may be required to evaluate the effectiveness of a mitigation measure or to identify if resources are responding as predicted to impacts from the Proposed Action. Monitoring programs would be developed in coordination between BOEM and agencies with jurisdiction over the resource to be monitored. The information generated by monitoring may be used to 1) modify how a mitigation measure identified in the COP or ROD is being implemented, 2) revise or develop new mitigation or monitoring measures for which compliance would be required under the RWF COP in accordance with

30 CFR 585.634(b), 3) develop measures for future projects, and/or 4) contribute to regional efforts for better understanding the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., a potential cumulative impact assessment tool).

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as *miles*, whereas nautical miles are referred to by name or by their abbreviation *nm*.

Table F-1. Environmental Protection Measures Committed to by Revolution Wind, LLC

EPM Number	Proposed Project Phase	EPM	Description	Resource Area Affected	BOEM's Identification of the Anticipated Enforcing Agency
Provided in COP Table 4.7-2					
AQ-1	Construction and installation, O&M, and decommissioning	Mitigation of air emissions	Vessels providing construction or maintenance services for the RWF will use low-sulfur fuel, where possible.	Air quality	Revolution Wind
AQ-2	Construction and installation, O&M, and decommissioning	Mitigation of air emissions	Vessel engines will meet the appropriate Environmental Protection Agency (EPA) air emission standards for nitrogen oxide (NO_X) emissions when operating within Emission Controls Areas.	Air quality	Revolution Wind
AQ-3	Construction and installation, O&M, and decommissioning	Mitigation of air emissions	Onshore Facilities equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards.	Air quality	Revolution Wind
AQ-4	Construction and installation, O&M, and decommissioning	Mitigation of air emissions	Marine engines with a model year of 2007 or later and non-road engines complying with the Tier 3 standards (in 40 CFR 89 or 1039) or better will be used to satisfy best available control technology (BACT) or lowest achievable emission rate (LAER).	Air quality	Revolution Wind
WQ-1	Construction and installation	Cable burial risk assessment	To the extent feasible, installation of the Inter-array cables (IACs), OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.	Water quality	Revolution Wind
WQ-2	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Water quality	Revolution Wind
WQ-3	Construction and installation, O&M, and decommissioning	Oil spill response plan (OSRP)	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP (COP Appendix D).	Water quality	Revolution Wind
WQ-4	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with United States Coast Guard (USCG) and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to Notice to Lessee (NTL) 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Water quality	Revolution Wind
WQ-5	Construction and installation	HDD contingency plan	At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids.	Water quality	Revolution Wind
WQ-6	Construction and installation, O&M, and decommissioning	Soil erosion and sediment control (SESC) plan	A SESC plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities.	Water quality	Revolution Wind
Coast-1	Construction and installation	Siting of onshore facilities	Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable.	Coastal and terrestrial habitats	Revolution Wind
Coast-2	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Coastal and terrestrial habitats	Revolution Wind

EPM Number	Proposed Project Phase	EPM	Description	Resource Area Affected	BOEM's Identification of the Anticipated Enforcing Agency
Coast-3	Construction and installation	HDD contingency plan	At the landfall location, drilling fluids will be managed within a contained system to be collected for reuse as necessary. An HDD Contingency Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids.	Coastal and terrestrial habitats	Revolution Wind
Coast-4	Construction and installation, O&M, and decommissioning	Spill prevention and control measures and SESC plan	Compliance with the RIPDES General Permit for Stormwater Discharges associated with Construction Activity which requires the implementation of a SESC Plan and spill prevention and control measures.	Coastal and terrestrial habitats	Revolution Wind
Coast-5	Construction and installation	SESC plan	The operator must implement the site-specific SESC Plan and maintain it during the entire construction process until the entire worksite is permanently stabilized by vegetation or other means. The measures employed in the SESC Plan use best management practices (BMPs) to minimize the opportunity for turbid discharges leaving a construction work area.	Coastal and terrestrial habitats	Revolution Wind
Coast-6	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	The spill prevention and control measures mandate that the operator identify all areas where spills can occur and their accompanying drainage points. The operator must also establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean up spills, and dispose of materials contaminated by spills. Spill prevention and control training will be provided for relevant personnel.	Coastal and terrestrial habitats	Revolution Wind
Coast-7	Construction and installation and O&M	Vegetation management	The perimeter surrounding Onshore Facilities will be managed to encourage the growth of native grasses, ferns, and low-growing shrubs. The management strategy will include the removal of invasive plants in compliance with state and federal regulations (e.g., herbicide use will not be permitted within regulated wetlands).	Coastal and terrestrial habitats	Revolution Wind
Coast-8	Construction and installation	Avoidance/mitigation of wetland impacts	In accordance with Section 2.9(B)(1)(d) of the Freshwater Wetland Rules, the Onshore Facilities will be designed to avoid and minimize impacts to freshwater wetlands to the maximum extent practicable. Any wetlands that will be impacted as a result of the Project will be mitigated via the federal and state permitting process in accordance with Section 404 of the CWA and the Freshwater Wetland Rules.	Coastal and terrestrial habitats	Revolution Wind
Coast-9	Construction and installation, O&M, and decommissioning	SESC plan	An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities.	Coastal and terrestrial habitats	Revolution Wind
Coast-10	Construction and installation	Vegetation management	The documented sickle-leaved golden aster population on the OnSS parcel will be protected during construction.	Coastal and terrestrial habitats	Revolution Wind
Ben-1	Preconstruction	Siting of RWF and RWEC	The RWF and RWEC will be sited to avoid and minimize impacts to sensitive habitats (e.g., hard-bottom habitats) to the extent practicable.	Benthic habitat and invertebrates	Revolution Wind
Ben-2	Construction and installation	Cable burial risk assessment	The IAC, OSS-Link Cable, and RWEC will avoid identified shallow hazards to the extent practicable.	Benthic habitat and invertebrates	Revolution Wind
Ben-3	Construction and installation	Cable burial risk assessment	To the extent feasible, installation of the IAC, OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.	Benthic habitat and invertebrates	Revolution Wind
Ben-4	Construction and installation	Cable burial risk assessment	To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed	Benthic habitat and invertebrates	Revolution Wind

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			conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.		
Ben-5	Construction and installation	Cable burial risk assessment	DP vessels will be used for installation of the IACs, OSS-Link Cable, and RWEC to the extent practicable.	Benthic habitat and invertebrates	Revolution Wind
Ben-6	Preconstruction	Anchoring plan	A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.	Benthic habitat and invertebrates	Revolution Wind
Ben-7	Preconstruction, construction and installation, and post-construction	Fisheries and benthic monitoring studies	Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region.	Benthic habitat and invertebrates	Revolution Wind
Ben-8	Preconstruction	Submerged aquatic vegetation (SAV) study	A preconstruction SAV survey will be completed to identify any new or expanded SAV beds. The Project design will be refined to avoid impacts to SAV to the greatest extent practicable.	Benthic habitat and invertebrates	Revolution Wind
Ben-9	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Benthic habitat and invertebrates	Revolution Wind
Ben-10	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials will be managed through the OSRP.	Benthic habitat and invertebrates	Revolution Wind
Ben-11	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with United States Coast Guard (USCG) and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to Notice to Lessee (NTL) 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Benthic habitat and invertebrates	Revolution Wind
Ben-12	Construction and installation	Soft start before pile driving	A ramp-up or soft start will be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-driving activities.	Benthic habitat and invertebrates	Revolution Wind
Ben-13	Construction and installation and O&M	Lighting minimization	Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations.	Benthic habitat and invertebrates	Revolution Wind
Ben-14	Construction and installation	Time of year (TOY) restrictions	Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Benthic habitat and invertebrates	Revolution Wind
Ben-15	Construction, O&M	Micrositing	Avoid and minimize adverse impacts to complex benthic habitats by micrositing WTG locations into low multibeam backscatter return areas and restricting seafloor disturbance (from anchoring, jack-up legs,	Benthic habitat and invertebrates	BOEM and BSEE

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			etc.) during construction to avoid and minimize impacts to higher multibeam backscatter return areas to the extent possible.		
Ben-16	Preconstruction and construction and installation	Siting of RWF and RWEC	The RWF and RWEC would use HRG surveys and other site characterization methods to identify, avoid, and minimize impacts to complex bottom habitats to the extent practicable	Benthic habitat and invertebrates	Revolution Wind
Ben-17	Construction and installation, O&M, and decommissioning	Fisheries and benthic monitoring plan	Revolution Wind has developed a fisheries and benthic habitat monitoring plan (dated October 2021) that has been prepared in accordance with recommendations set forth in Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2019).	Benthic habitat and invertebrates	Revolution Wind
Fin-1	Construction and installation	Cable burial risk assessment	To the extent feasible, installation of the IAC, OSS-Link Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.	Finfish and essential fish habitat	Revolution Wind
Fin-2	Construction and installation	TOY restrictions	Based on the coordination with RIDEM and NOAA NMFS to date, in general, offshore site preparation for and installation of the RWEC-RI north of the Convention on the International Regulations for Preventing Collisions at Sea ("COLREGS") line of demarcation will occur between the day after Labor Day and February 1 to avoid and minimize impacts to winter flounder (*Pseudopleuronectes americanus*) and shellfish. Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Finfish and essential fish habitat	Revolution Wind
Fin-3	Construction and installation	Cable burial risk assessment	To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.	Finfish and essential fish habitat	Revolution Wind
Fin-4	Construction and installation	Cable burial risk assessment	DP vessels will be used for installation of the IACs, OSS-Link Cable, and RWEC to the extent practicable.	Finfish and essential fish habitat	Revolution Wind
Fin-5	Preconstruction	Anchoring plan	A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.	Finfish and essential fish habitat	Revolution Wind
Fin-6	Preconstruction, construction and installation, and post-construction	Fisheries and benthic monitoring studies	Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region.	Finfish and essential fish habitat	Revolution Wind
Fin-7	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Finfish and essential fish habitat	Revolution Wind
Fin-8	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials will be managed through the OSRP.	Finfish and essential fish habitat	Revolution Wind

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Fin-9	Construction and installation	Soft start before pile driving	A ramp-up or soft start will be used at the beginning of each pile segment during impact pile driving and/or vibratory pile driving to provide additional protection to mobile species in the vicinity by allowing them to vacate the area prior to the commencement of pile-driving activities.	Finfish and essential fish habitat	Revolution Wind
Fin-10	Construction and installation and O&M	Lighting minimization	Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations.	Finfish and essential fish habitat	Revolution Wind
Fin-11	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Finfish and essential fish habitat	Revolution Wind
Fin-12	Construction and installation	TOY restrictions	Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Finfish and essential fish habitat	Revolution Wind
Fin-13	Construction and installation, post-construction and installation monitoring	Gear identification	To facilitate identification of gear on any entangled animals, all trap/pot gear used in the surveys would be uniquely marked to distinguish it from other commercial or recreational gear.	Finfish and essential fish habitat	Revolution Wind, BOEM, BSEE, and NMFS
MM-1	Construction and installation	Establishment of exclusion and monitoring zones for impact pile driving	Exclusion and monitoring zones for marine mammals and sea turtles will be established for impact and vibratory pile-driving activities.	Marine mammals	Revolution Wind
MM-2	Construction and installation	Impact and vibratory pile-driving mitigation measures	The following measures will be implemented for impact and vibratory pile-driving activities. These measures will include seasonal restrictions, soft-start measures, shutdown procedures, marine mammal and sea turtle monitoring protocols, the use of qualified and National Oceanic and Atmospheric Administration (NOAA)-approved Protected Species Observers, and noise attenuation systems such as bubble curtains, as appropriate.	Marine mammals	Revolution Wind
MM-3	Construction and installation, O&M, and decommissioning	Vessel speed restrictions	Vessels will follow NOAA guidelines for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions.	Marine mammals	Revolution Wind
MM-4	Construction and installation, O&M, and decommissioning	Marine mammal, sea turtle, and marine debris awareness training	All personnel working offshore will receive training on marine mammal and sea turtle awareness and marine debris awareness.	Marine mammals	Revolution Wind
MM-5	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Marine mammals	Revolution Wind
MM-6	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Marine mammals	Revolution Wind
MM-7	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the	Marine mammals	Revolution Wind

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			handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.		
MM-8	Construction and installation	Cable burial risk assessment	To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.	Marine mammals	Revolution Wind
MM-9	Construction and installation, post-construction and installation monitoring	Gear identification	To facilitate identification of gear on any entangled animals, all trap/pot gear used in the surveys would be uniquely marked to distinguish it from other commercial or recreational gear.	Marine mammals	Revolution Wind, BOEM, BSEE, and NMFS
MM-10	Construction and installation and post-construction and installation	MMPA application measures	Revolution Wind is committed to minimizing impacts to marine mammal species through a comprehensive monitoring and mitigation program. The mitigation measures identified in the MMPA Incidental Take Regulations application to be implemented include, but are not limited to, the following: 1. Noise attenuation through use of a noise mitigation system; 2. Seasonal restrictions; 3. Standard PSO training and equipment requirements; 4. Visual monitoring; including low visibility monitoring tools; 5. Passive acoustic monitoring; 6. Establishment and monitoring of shutdown zones 7. Pre-start clearance; 8. Ramp-up (soft-start) procedures; 9. Operations monitoring; 10. Operational shutdowns and delay; 11. Sound source measurements of at least one foundation installation 12. Survey sighting coordination; 13. Vessel strike avoidance procedures; and Data recording and reporting procedures.	Marine mammals	BOEM and BSEE
ST-1	Construction and installation	Establishment of exclusion and monitoring zones for impact pile driving	Exclusion and monitoring zones for marine mammals and sea turtles will be established for impact and vibratory pile-driving activities.	Sea turtles	Revolution Wind
ST-2	Construction and installation	Impact and vibratory pile-driving mitigation measures	The following measures will be implemented for impact and vibratory pile-driving activities. These measures will include seasonal restrictions, soft-start measures, shut-down procedures, marine mammal and sea turtle monitoring protocols, the use of qualified and NOAA-approved Protected Species Observers, and noise attenuation systems such as bubble curtains, as appropriate.	Sea turtles	Revolution Wind
ST-3	Construction and installation, O&M, and decommissioning	Vessel speed restriction	Vessels will follow NOAA guidelines for marine mammal and sea turtle strike avoidance measures, including vessel speed restrictions.	Sea turtles	Revolution Wind
ST-4	Construction and installation, O&M, and decommissioning	Marine mammal, sea turtle, and marine debris awareness training	All personnel working offshore will receive training on marine mammal and sea turtle awareness and marine debris awareness.	Sea turtles	Revolution Wind
ST-5	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Sea turtles	Revolution Wind

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ST-6	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Sea turtles	Revolution Wind
ST-7	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Sea turtles	Revolution Wind
ST-8	Construction and installation	Cable burial risk assessment	To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.	Sea turtles	Revolution Wind
ST-9	Construction and installation, post-construction and installation monitoring	Gear identification	To facilitate identification of gear on any entangled animals, all trap/pot gear used in the surveys would be uniquely marked to distinguish it from other commercial or recreational gear.	Sea turtles	Revolution Wind, BOEM, BSEE, and NMFS
Bird-1	Construction and installation	TOY restrictions for tree and shrub removal	To the extent feasible, tree and shrub removal for Onshore Facilities will occur outside the avian nesting and bat roosting period, May 1 through August 15. If tree and shrub removal cannot be avoided during this season, Revolution Wind will coordinate with appropriate agencies to determine appropriate course of action.	Birds	Revolution Wind
Bird-2	Construction and installation and O&M	WTG spacing and layout	Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs will allow avian species to avoid individual WTGs and minimize risk of potential collision.	Birds	Revolution Wind
Bird-3	Construction and installation and O&M	Lighting minimization	Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations.	Birds	Revolution Wind
Bird-4	Construction and installation and O&M	Lighting minimization with lighting technology	Revolution Wind will comply with Federal Aviation Administration (FAA) and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimizes impacts on avian species.	Birds	Revolution Wind
Bird-5	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Birds	Revolution Wind
Bird-6	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Birds	Revolution Wind
Bird-7	Construction and installation, O&M, and decommissioning	SESC plan	An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities.	Birds	Revolution Wind

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Bird-8	Construction and installation	Siting of onshore facilities	Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable.	Birds	Revolution Wind
Bird-9	Construction and installation	Burial of onshore transmission cables	The Onshore Transmission Cables will be buried; therefore, avoiding the risk to avian and bat species associated with overhead lines.	Birds	Revolution Wind
Bird-10	O&M	Adaptive mitigation for birds and bats	Revolution Wind has developed a draft Avian and Bat Post-Construction Monitoring Plan (see Appendix G and COP Appendix AA) for the Project that summarizes the approach to monitoring; describes overarching monitoring goals and objectives; identifies the key avian species, priority questions, and data gaps unique to the region and Project Area that will be addressed through monitoring; and describes methods and time frames for data collection, analysis, and reporting. Post-construction monitoring will assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Project's Avian Risk Assessment. Focus may be placed on improving knowledge of ESA-listed species occurrence and movements offshore, avian collision risk, species/species-group displacement, or similar topics. Where possible, monitoring conducted by Revolution Wind will build on and align with post-construction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast region. Revolution Wind will engage with federal and state agencies and environmental groups (eNGOs) to identify appropriate monitoring options and technologies and to facilitate acceptance of the final plan.	Birds	Revolution Wind, BOEM, BSEE, USFWS
Bird-11	Construction and installation, O&M, and decommissioning	Adaptive mitigation for birds and bats	Revolution Wind will document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and United States Fish and Wildlife Service (USFWS).	Birds	Revolution Wind
Bird-12	Construction and installation	TOY restrictions	Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Birds	Revolution Wind
Bat-1	Construction and installation and O&M	Lighting minimization	Construction and operational lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations.	Bats	Revolution Wind
Bat-2	Construction and installation	TOY restrictions for tree and shrub removal	To the extent feasible, tree and shrub removal for Onshore Facilities will occur outside the avian nesting and bat roosting period; May 1 through August 15. If tree and shrub removal cannot be avoided during this season, Revolution Wind will coordinate with appropriate agencies to determine appropriate course of action.	Bats	Revolution Wind
Bat-3	Construction and installation and O&M	WTG spacing and layout	Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This wide spacing of WTGs will allow avian and bat species to avoid individual WTGs and minimize risk of potential collision.	Bats	Revolution Wind
Bat-4	Construction and installation and O&M	Lighting minimization with lighting technology	Revolution Wind will comply with FAA and USCG requirements for lighting while using lighting technology (e.g., low-intensity strobe lights) that minimize impacts on avian and bat species.	Bats	Revolution Wind
Bat-5	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Bats	Revolution Wind
Bat-6	Construction and installation, O&M, and decommissioning	SESC plan	An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities.	Bats	Revolution Wind
Bat-7	Construction and installation	Siting of onshore facilities	Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable.	Bats	Revolution Wind
Bat-8	Construction and installation	Burial of onshore transmission cables	The Onshore Transmission Cables will be buried; therefore, avoiding the risk to avian and bat species associated with overhead lines.	Bats	Revolution Wind

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Bat-9	Construction and installation, O&M, and decommissioning	Adaptive mitigation for birds and bats	Revolution Wind will document any dead (or injured) birds/bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS.	Bats	Revolution Wind
Bat-10	Construction and installation	TOY restrictions	Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Bats	Revolution Wind
Bat-11	Construction	Minimization of long=term impacts	Comply with the Northern Long-Eared Bat 4(d) rule (81 FR 1900-1922) to avoid and minimize long-term impacts on the species and sensitive upland habitats.	Bats	BOEM and USFWS
CR-1	Construction and installation and O&M	Aircraft detection lighting system (ADLS) (or a similar system)	Revolution Wind will use Aircraft Detection Lighting System (ADLS) (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval.	Cultural resources	Revolution Wind
CR-2	Construction and installation and O&M	WTG design	RWF WTGs will have uniform design, speed, height, and rotor diameter, thereby mitigating visual clutter.	Cultural resources	Revolution Wind
CR-3	Construction and installation and O&M	WTG design	The WTGs will be painted Pure White (RAL 9010) to Light Grey (RAL 7035), as recommended by BOEM and the FAA. This color white of the turbines generally blends well with the sky at the horizon and eliminates the need for daytime warning lights or red paint marking of the blade tips.	Cultural resources	Revolution Wind
CR-4	Construction and installation	Burial of onshore transmission cables and ICF interconnection	The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties.	Cultural resources	Revolution Wind
CR-5	Construction and installation and O&M	Onshore facilities location	The Onshore Facilities will be located adjacent to an existing substation on a parcel zoned for commercial and industrial/utility use.	Cultural resources	Revolution Wind
CR-6	Construction and installation and O&M	Onshore facilities screening	Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise.	Cultural resources	Revolution Wind
CR-7	Preconstruction	Siting of RWF and RWEC	The RWF and RWEC will be sited to avoid or minimize impacts to potential submerged cultural sites and paleolandforms, to the extent practicable.	Cultural resources	Revolution Wind
CR-8	Construction and installation and O&M	Marine survey design, execution, and interpretation	Native American Tribal representatives were involved, and will continue to be involved, in marine survey protocol design, execution of the surveys, and interpretation of the results.	Cultural resources	Revolution Wind
CR-9	Preconstruction	Anchoring plan	A plan for vessels will be developed prior to construction to identify no-anchorage areas to avoid documented sensitive resources.	Cultural resources	Revolution Wind
CR-10	Construction and installation	Unanticipated discovery plan (UDP)	An Unanticipated Discovery Plan (UDP) will be implemented that will include stop-work and notification procedures to be followed if a potentially significant archaeological resource is encountered during construction.	Cultural resources	Revolution Wind
CR-11	Construction and installation	Siting of onshore facilities	Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable.	Cultural resources	Revolution Wind
CR-12	Preconstruction	Siting of onshore facilities	Onshore Facilities will be sited to avoid or minimize impacts to potential terrestrial archeological resources, to the extent practicable.	Cultural resources	Revolution Wind
VR-1	Construction and installation	ADLS (or a similar system)	Revolution Wind will use ADLS (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval.	Visual resources	Revolution Wind
VR-2	Construction and installation and O&M	WTG design	RWF WTGs will have uniform design, speed, height, and rotor diameter, thereby mitigating visual clutter.	Visual resources	Revolution Wind

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VR-3	Construction and installation and O&M	WTG design	The WTGs will be painted Pure White (RAL 9010) to Light Grey (RAL 7035), as recommended by BOEM and the FAA. This color white of the turbines generally blends well with the sky at the horizon and eliminates the need for daytime warning lights or red paint marking of the blade tips.	Visual resources	Revolution Wind
VR-4	Construction and installation	Burial of onshore transmission cables and ICF interconnection	The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties.	Visual resources	Revolution Wind
VR-5	Construction and installation and O&M	Onshore facilities screening	Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise.	Visual resources	Revolution Wind
VR-6	Construction and installation and O&M	Onshore facilities design	Non-reflective paints and finishes will be used to the extent practicable on Onshore Facilities to minimize reflected glare.	Visual resources	Revolution Wind
VR-7	Construction and installation and O&M	Lighting minimization at the ONSS and ICF	Lighting at the OnSS and ICF will be kept to a minimum and turned on only as needed by manual switch.	Visual resources	Revolution Wind
Demo-1	Construction and installation, O&M, and decommissioning	Employment of local workers	Where possible, local workers will be hired to meet labor needs for Project construction, O&M, and decommissioning.	Demographics, employment, and economics	Revolution Wind
Demo-2	Construction and installation	TOY restrictions of onshore facility construction	The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day.	Demographics, employment, and economics	Revolution Wind
Demo-3	Construction and installation and O&M	Onshore facilities screening	Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise.	Demographics, employment, and economics	Revolution Wind
Demo-4	Construction and installation	Coordination with local authorities to address environmental and community concerns	Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values.	Demographics, employment, and economics	Revolution Wind
Rec-1	Construction and installation	Fisheries communication plan	A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Project website, public notices to mariners and vessel float plans, and a fisheries liaison. Revolution Wind will submit information to the USCG to issue Local Notice to Mariners during offshore installation activities.	Recreation and tourism	Revolution Wind
Rec-2	Construction and installation	TOY restrictions on onshore facilities construction	The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day.	Recreation and tourism	Revolution Wind
Rec-3	Construction and installation	Coordination with local authorities to address environmental and community concerns	Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values.	Recreation and tourism	Revolution Wind
ComFish-1	Construction and installation and O&M	WTG spacing and layout	Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations.	Commercial and recreational fishing	Revolution Wind

EPM Number	Proposed Project Phase	EPM	Description	Resource Area Affected	BOEM's Identification of the Anticipated Enforcing Agency
ComFish-2	Construction and installation	Cable burial risk assessment	To the extent feasible, installation of the Inter-Array Cable, OSS Interconnector Cable, and RWEC will occur using equipment such as mechanical cutter, mechanical plow, or jet plow. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.	Commercial and recreational fishing	Revolution Wind
ComFish-3	Construction and installation	Cable burial risk assessment	To the extent feasible, the RWEC, IAC, and OSS-Link Cable will typically target a burial depth of 4 to 6 ft (1.2 to 1.8 m) below seabed. The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment.	Commercial and recreational fishing	Revolution Wind
ComFish-4	Construction and installation and O&M	Implementation of BMPS	As appropriate and feasible, BMPs will be implemented to minimize impacts on fisheries, as described in the *Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2020).	Commercial and recreational fishing	Revolution Wind
ComFish-5	Preconstruction, construction and installation, and post-construction	Fisheries and benthic monitoring studies	Revolution Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and postconstruction. Fisheries and benthic monitoring studies are being planned to assess the impacts associated with the Project on economically and ecologically important fisheries resources. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Revolution Wind at other wind farms in the region.	Commercial and recreational fishing	Revolution Wind
ComFish-6	Construction and installation and O&M	WTG lighting and ais installation	Each WTG will be marked and lit with both USCG and approved aviation lighting. Automatic Identification Systems (AISs) will be installed at the RWF marking the corners of the wind farm to assist in safe navigation.	Commercial and recreational fishing	Revolution Wind
ComFish-7	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Commercial and recreational fishing	Revolution Wind
ComFish-8	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Commercial and recreational fishing	Revolution Wind
ComFish-9	Construction and installation, O&M, and decommissioning	Marine debris awareness training	All vessels will comply with USCG and EPA regulations that require operators to develop waste management plans, post informational placards, manifest trash sent to shore, and use special precautions such as covering outside trash bins to prevent accidental loss of solid materials. Vessels will also comply with BOEM lease stipulations that require adherence to NTL 2015-G03, which instructs operators to exercise caution in the handling and disposal of small items and packaging materials, requires the posting of placards at prominent locations on offshore vessels and structures, and mandates a yearly marine trash and debris awareness training and certification process.	Commercial and recreational fishing	Revolution Wind
ComFish-10	Construction and installation and O&M	Fisheries communication plan	Communications and outreach with the commercial and recreational fishing industries will be guided by the Project-specific Fisheries Communication Plan. Revolution Wind has agreed to share fisheries monitoring data with regulatory agencies and interested stakeholders upon request. Data sharing will occur on an annual cycle, which may be unique to each survey, and all data will be subject to rigorous quality assurance and quality control criterion prior to dissemination.	Commercial and recreational fishing	Revolution Wind
ComFish-11	Construction and installation, O&M, and decommissioning	Coordination with appropriate federal, state, and local contacts	Project construction, O&M, and decommissioning activities will be coordinated with appropriate contacts at USCG, Naval Undersea Warfare Center (NUWC)-Newport RI, the Northeast Marine Pilots Association, and Department of Defense (DoD) command headquarters.	Commercial and recreational fishing	Revolution Wind

EPM Number	Proposed Project Phase	EPM	Description	Resource Area Affected	BOEM's Identification of the Anticipated Enforcing Agency
ComFish-12	Preconstruction	Siting of RWEC	RWEC was sited to avoid conflicts with DoD use areas and navigational areas identified by the USCG, as applicable.	Commercial and recreational fishing	Revolution Wind
ComFish-13	Construction and installation	Fisheries communication plan	A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG).	Commercial and recreational fishing	Revolution Wind
ComFish-14	Construction and installation	TOY restrictions	Revolution Wind will continue to coordinate with RIDEM and NOAA NMFS regarding TOY restrictions through the permitting process and will adhere to requirements imposed by these agencies.	Commercial and recreational fishing	Revolution Wind
Nav-1	Construction and installation and O&M	WTG spacing and layout	Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI-MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations.	Navigation and vessel traffic	Revolution Wind
Nav-2	Construction and installation and O&M	WTG lighting and ais installation	Each WTG will be marked and lit with both USCG and approved aviation lighting. AIS will be installed at the RWF marking the corners of the wind farm to assist in safe navigation.	Navigation and vessel traffic	Revolution Wind
Nav-3	Construction and installation, O&M, and decommissioning	Spill prevention and control measures	Revolution Wind will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Navigation and vessel traffic	Revolution Wind
Nav-4	Construction and installation, O&M, and decommissioning	OSRP	Accidental spill or release of oils or other hazardous materials offshore will be managed through the OSRP.	Navigation and vessel traffic	Revolution Wind
Nav-5	Construction and installation, O&M, and decommissioning	Coordination with appropriate federal, state, and local contacts	Project construction, O&M, and decommissioning activities will be coordinated with appropriate contacts at USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and DoD command headquarters.	Navigation and vessel traffic	Revolution Wind
Nav-6	Preconstruction	Siting of RWEC	RWEC was sited to avoid conflicts with DoD use areas and navigational areas identified by the USCG, as applicable.	Navigation and vessel traffic	Revolution Wind
Nav-7	Construction and installation	Fisheries communication plan	A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG).	Navigation and vessel traffic	Revolution Wind
Nav-8	Construction and installation, O&M, and decommissioning	Consultation with appropriate federal, state, and local agencies	Revolution Wind will consult with USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and regional ferry service operators to avoid or reduce use conflicts.	Navigation and vessel traffic	Revolution Wind
Land-1	Construction and installation	Siting of onshore facilities	Onshore Facilities will be sited within previously disturbed and developed areas to the extent practicable.	Land use and coastal infrastructure	Revolution Wind
Land-2	Construction and installation	Coordination with local authorities to address environmental and community concerns	Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values.	Land use and coastal infrastructure	Revolution Wind

EPM Number	Proposed Project Phase	EPM	Description	Resource Area Affected	BOEM's Identification of the Anticipated Enforcing Agency
Land-3	Construction and installation, O&M, and decommissioning	SESC plan	An SESC Plan, including erosion and sedimentation control measures, will be implemented to minimize potential water quality impacts during construction and operation of the Onshore Facilities.	Land use and coastal infrastructure	Revolution Wind
Other-1	Construction and installation and O&M	WTG spacing and layout	Revolution Wind is committed to an indicative layout scenario with WTGs sited in a grid with approximately 1.15-mi (1-nm) by 1.15-mi (1-nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI/MA WEA. This layout has been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This layout will also provide a uniform, wide spacing among structures to facilitate search and rescue operations.	Other uses	Revolution Wind
Other-2	Construction and installation, O&M, and decommissioning	Consultation with appropriate federal, state, and local agencies	Revolution Wind will consult with USCG, NUWC-Newport RI, the Northeast Marine Pilots Association, and regional ferry service operators to avoid or reduce use conflicts.	Other uses	Revolution Wind
Other-3	Construction and installation and O&M	WTG lighting and ais installation	Each WTG will be marked and lit with both USCG and approved aviation lighting. AIS will be installed at the RWF marking the corners of the wind farm to assist in safe navigation.	Other uses	Revolution Wind
EJ-1	Construction and installation, O&M, and decommissioning	Employment of local workers	Where possible, local workers will be hired to meet labor needs for Project construction, O&M, and decommissioning.	Environmental justice	Revolution Wind
EJ-2	Construction and installation	TOY restrictions on onshore facilities construction	The Onshore Facilities construction schedule will be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day.	Environmental justice	Revolution Wind
EJ-3	Construction and installation	Coordination with local authorities to address environmental and community concerns	Revolution Wind will coordinate with local authorities during construction of Onshore Facilities to minimize local traffic impacts; further, these Project components will be constructed in compliance with applicable regulations related to environmental and community concerns (e.g., traffic and erosion). In addition, traffic will be temporary and will not impact long-term property values.	Environmental justice	Revolution Wind
EJ-4	Construction and installation, O&M, and decommissioning	Studies of contaminated soil and groundwater in EJ focus areas	Investigation and remediation of contaminated soil and groundwater must be carried out in accordance with RIDEM regulations and policies regarding Environmental Justice Focus Areas including enhanced stakeholder outreach.	Environmental justice	Revolution Wind
EJ-5	Construction and installation	ADLS (or a similar system)	Revolution Wind will use ADLS (or a similar system), pursuant to approval by the FAA and commercial and technical feasibility at the time of FDR/FIR approval.	Environmental justice	Revolution Wind
EJ-6	Construction and installation	Burial of onshore transmission cables and ICF interconnection	The Onshore Transmission Cable and ICF Interconnection ROW will be buried, minimizing potential impacts to adjacent properties.	Environmental justice	Revolution Wind
EJ-7	Construction and installation and O&M	Onshore facilities screening	Screening will be implemented at the aboveground Onshore Facilities to the extent feasible, to reduce potential visibility and noise.	Environmental justice	Revolution Wind

Table F-2. Potential Additional Mitigation and Monitoring Measures

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
BOEM OCS Study 2020-039 – Radar Systems Mitigations to Operations					
1	O&M	Mitigation for ASR-8/9 radars	Operational mitigations identified for impacts on ASR-8/9: • Passive aircraft tracking using ADS-B or signal/transponder • Increasing aircraft altitude near radar • Sensitivity time control (range-dependent attenuation) • Range azimuth gating (ability to isolate/ignore signals from specific range-angle gates) • Track initiation inhibit, velocity editing, plot amplitude thresholding (limiting the amplitude of certain signals) • Modification mitigations for ARSR-4 and for ASR-8/9 systems: • Utilizing the dual beams of the radar simultaneously • In-fill radars	Other uses – radar	BOEM and BSEE
2	O&M	Mitigation for oceanographic high frequency radars	To mitigate operational impacts on oceanographic high-frequency radars, the following options have been identified: • Data sharing from turbine operators to include the following: o Sharing real-time telemetry of surface currents and other oceanographic data measured at locations in the Project with radar operators into the public domain o Sharing time-series of blade rotation rates, nacelle bearing angles, and other information about the operational state of each of the Project's turbines with radar operators to aid interference mitigation • Wind farm curtailment/curtailment agreement Additional modifications identified for oceanographic high-frequency radar systems to mitigate impacts: • Signal processing enhancements • Antenna modifications	Other uses – radar	BOEM and BSEE
3	O&M	Mitigation for NEXRAD weather radar systems	Operational mitigations to NEXRAD weather radar systems include: • Wind farm curtailment/curtailment agreement Research is being conducted to determine whether impacts on weather radar can be mitigated by using phased array radars to achieve a null in the antenna radiation pattern in the direction of the wind turbine.	Other uses – radar	BOEM and BSEE
4	Construction, O&M, decommissioning	Add conditions of COP approval	Require the following conditions of COP approval to mitigate potential impacts on ASR-8/9: • Notify NORAD 30 to 60 days ahead of Project completion and when the Project is complete and operational for radar adverse-impact management (RAM) scheduling • Contribute funds toward execution of the RAM • Curtailment of operations for national security or defense purposes as described in the leasing agreement	Other uses – radar	BOEM and BSEE
BOEM-proposed Bird and Bat Mitigation Measures					
1	O&M	Adaptive mitigation for birds and bats	If the reported post-construction bird and bat monitoring results (generated as part of Revolution Wind's *Avian and Bat Post- Construction Monitoring Framework* [Biodiversity Research Institute 2022]) indicate bird	Birds and bats	BOEM, BSEE, and USFWS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
			and bat impacts deviate substantially from the impact analysis included in this EIS, then Revolution Wind must make recommendations for new mitigation measures or monitoring methods.		
2	O&M	Bird deterrents	Install bird deterrent devices to minimize bird attraction to operating turbines and on the OSS, where appropriate and where Revolution Wind determines such devices can be safely deployed. The Lessor must concur with proposed locations. Revolution Wind must confirm location(s) of bird deterrent devices as part of the as-built documentation submitted with the facility installation report.	Birds	USFWS
3	Construction	TOY restrictions	Conduct marine construction activities during approved in-water work windows developed in consultation with the Services.	Birds and bats	BOEM and USFWS
BOEM-proposed Commercial Fisheries and For-Hire Recreational Fishing Mitigation Measures					
1	Construction, O&M	Compensation for Gear Loss and Damage	The Lessee shall implement a gear loss and damage compensation program consistent with BOEM's draft guidance for Mitigating Impacts to Commercial and recreational fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585 or as modified in response to public comment.	Commercial and recreational fisheries	BOEM and BSEE
2	Construction, O&M	Compensation for Lost Fishing Income	The Lessee shall implement a compensation program for lost income for commercial and recreational fishermen and other eligible fishing interests for construction and operations consistent with BOEM's draft guidance for Mitigating Impacts to Commercial and recreational fisheries on the Outer Continental Shelf Pursuant to 30 CFR 585 or as modified in response to public comment.	Commercial and recreational fisheries	BOEM and BSEE
3	O&M	Mobile gear friendly cable protection measures	Cable protection measures should reflect the pre-existing conditions at the site. This mitigation measure chiefly ensures that seafloor cable protection does not introduce new hangs for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered/sloped edges. If cable protection is necessary in "non-trawlable" habitat, such as rocky habitat, then the Lessee should consider using materials that mirror the benthic environment.	Commercial and recreational fisheries	BOEM and BSEE
DOD-proposed Measures					
1	O&M	Fiber-optic sensing technology	Distributed fiber-optic sensing (DFOS) technology proposed for the wind energy project or associated transmission cables would be reviewed by the DOD to ensure that DFOS is not used to detect sensitive data from DOD activities, conduct any other type of surveillance of U.S. Government operations, or to otherwise pose a threat to national security.	Other uses – military and national security	BOEM, BSEE, and DOD
NHPA Mitigation Measures					
1	Construction and installation	Avoid or minimize and mitigate impacts on identified NRHP-eligible cultural resources	Mitigation measures for cultural resources are drafted in the memorandum of agreement (MOA) and its historic property treatment plans attached in Appendix K. Revolution Wind committed measures identified in COP Appendix BB – Cultural resources Avoidance, Minimization, and Mitigation Measures would also be incorporated by BOEM into COP approval. This MOA and its requirements would be set by BOEM under NHPA Section 106 as a condition of BOEM's signing the ROD. Under the MOA, adverse effects from the Project to NRHP-eligible cultural resources, including NHLs and TCPs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f).	Cultural resources	BOEM, BSEE, USACE
BOEM-proposed Mitigation and Monitoring Measures in the BA submitted to NMFS					
1	Construction and installation, O&M, and decommissioning	Marine debris awareness training	The Lessee would ensure that vessel operators, employees, and contractors engaged in offshore activities pursuant to the approved COP complete marine trash and debris awareness training annually. The training	Finfish, marine mammals, sea turtles	BOEM and BSEE

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
			consists of two parts: (1) viewing a marine trash and debris training video or slide show (described below); and (2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris or by contacting BSEE. The training videos, slides, and related material may be downloaded directly from the website. Operators engaged in marine survey activities would continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that their employees and contractors are in fact trained. The training process would include the following elements: • Viewing of either a video or slide show by the personnel specified above; • An explanation from management personnel that emphasizes their commitment to the requirements; • Attendance measures (initial and annual); and • Recordkeeping and the availability of records for inspection by DOI. By January 31 of each year, the Lessee would submit to DOI an annual report that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. The Lessee would send the reports via email to BOEM (at renewable_reporting@boem.gov) and to BSEE (at marinedebris@bsee.gov).		
2	Construction and installation and post- construction and installation	Marine debris elimination	Marking: Materials, equipment, tools, containers, and other items used in OCS activities which are of such shape or properly secured to prevent loss overboard. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed.	Birds, Finfish, marine mammals, sea turtles	BOEM and BSEE
3	Construction and installation and post- construction and installation	Incorporate LOA requirements	The measures required by the final MMPA Letter of Authorization (LOA) for Incidental Take Regulations would be incorporated into COP approval, and BOEM and/or BSEE will monitor compliance with these measures.	Marine mammals	BOEM and BSEE
4	Construction, O&M, and decommissioning	Passive acoustic monitoring (PAM)	Use PAM buoys or autonomous PAM devices to record ambient noise, marine mammals, and cod vocalizations in the Lease Area before, during, and immediately after construction (at least 3 years of operation) to monitor Project noise. The archival recorders must have a minimum capability of detecting and storing acoustic data on anthropogenic noise sources (such as vessel noise, pile driving, WTG operation, and whale detections), marine mammals, and cod vocalizations in the Lease Area. Monitoring would also occur during the decommissioning phase. The total number of PAM stations and array configuration will depend on the size of the zone to be monitored, the amount of noise expected in the area, and the characteristics of the signals being monitored to accomplish both monitoring during constructions, and also meet post-construction monitoring needs. Results must be provided within 90 days of construction completion and again within 90 days of the 1-year, 2-year, and 3-year anniversary of collection. The underwater acoustic monitoring must follow standardized measurement and processing methods and visualization metrics developed by the Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Mid- and South Atlantic OCS (see https://adeon.unh.edu/). At least two buoys must be independently deployed within or bordering the Lease Area or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the RI and MA Lease Areas.	Finfish, marine mammals, sea turtles	BOEM, BSEE, and NMFS
5	Construction and installation, post-construction and installation monitoring	PAM plan	BOEM, BSEE, and USACE would ensure that Revolution Wind prepares a PAM Plan that describes all proposed equipment, deployment locations, detection review methodology and other procedures, and protocols related to the required use of PAM for monitoring. This plan would be submitted to NMFS, BOEM and BSEE (at OSWsubmittals@bsee.gov) for review and concurrence at least 90 days prior to the planned start of pile driving. EFH conservation recommendations for PAM would be incorporated into the plan, and BOEM and/or BSEE will monitor compliance with these measures.	Finfish, marine mammals, sea turtles	BOEM, BSEE, and NMFS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
6	Construction and installation	Pile driving monitoring plan	BOEM would ensure that Revolution Wind prepare and submit a *Pile Driving Monitoring Plan* to NMFS and BSEE (at OSWsubmittals@bsee.gov) for review and concurrence at least 90 days before start of pile driving.	Marine mammals, Sea turtles	BOEM, BSEE, and NMFS
7	Construction and installation	PSO coverage	BOEM, BSEE, and USACE would ensure that PSO coverage is sufficient to reliably detect marine mammals and sea turtles at the surface in clearance and shutdown zones to execute any pile driving delays or shutdown requirements. If, at any point prior to or during construction, the PSO coverage that is included as part of the proposed action is determined not to be sufficient to reliably detect ESA-listed whales and sea turtles within the clearance and shutdown zones, additional PSOs and/or platforms would be deployed. Determinations prior to construction would be based on review of the *Pile Driving Monitoring Plan*. Determinations during construction would be based on review of the weekly pile driving reports and other information, as appropriate.	Marine mammals, Sea turtles	BOEM, BSEE, and USACE
8	Construction and installation	Sound field verification	BOEM, BSEE, and USACE would ensure that if the clearance and/or shutdown zones are expanded, PSO coverage is sufficient to reliably monitor the expanded clearance and/or shutdown zones. Additional observers would be deployed on additional platforms for every 1,500 m that a clearance or shutdown zone is expanded beyond the distances modeled prior to verification. To validate the estimated sound field, sound field verification measurements will be conducted during pile driving of the first three monopiles installed over the course of the Project, with noise attenuation activated. A Sound Field Verification Plan will be submitted to NMFS, BOEM, and BSEE for review and approval at least 90 days prior to planned start of pile driving. This plan will describe how Revolution Wind will ensure that the first three monopile installation sites selected for sound field are representative of the rest of the monopile installation sites and, in the case that they are not, how additional sites will be selected for sound field verification. This plan will also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS. The plan will describe how the effectiveness of the sound attenuation methodology will be evaluated based on the results. In the event that Revolution Wind obtains technical information that indicates a subsequent monopile is likely to produce larger sound fields, SFV will be conducted for those subsequent monopiles.	Marine mammals, Sea turtles, Finfish, Benthic Habitat, EFH, Invertebrates	BOEM, BSEE, and NMFS
9	Construction and installation	Shutdown zones and clearance zone adjustment	BOEM, BSEE, and NMFS may consider adjustments in the pre-start clearance and/or shutdown zones based on the initial sound field verification (SFV) measurements. Revolution Wind will provide the initial results of the SFV measurements to NMFS in an interim report after each monopile installation for the first three piles as soon as they are available but no later than 48 hours after each installation. Revolution Wind will conduct a SFV to empirically determine the distances to the isopleths corresponding to Level A harassment and Level B harassment thresholds, including at the locations corresponding to the modeled distances to the Level A harassment and Level B harassment thresholds. If initial SFV measurements indicate distances to the isopleths are less than the distances predicted by modeling assuming 10 dB attenuation, Revolution Wind may request a modification of the clearance and shutdown zones for impact pile driving. For a modification request to be considered by NMFS, Revolution Wind must have conducted SFV on at least three piles to verify that zone sizes are consistently smaller than predicted by modeling. If initial SFV measurements indicate distances to the isopleths are greater than the distances predicted by modeling, Revolution Wind will implement additional sound attenuation measures prior to conducting additional pile driving. Additional measures may include improving the efficacy of the implemented noise attenuation technology and/or modifying the piling schedule to reduce the sound source. If modeled zones cannot be achieved by these corrective actions, Revolution Wind will install an additional noise mitigation system to achieve the modelled ranges. Each sequential modification will be evaluated empirically by SFV. Additionally, in the event that SFV measurements continue to indicate distances to isopleths corresponding to Level A harassment and Level B harassment thresholds are consistently greater than the distances predicted by modeling, NMFS may expand the relevant clearance and shutdown zones and associated monitoring measures.	Marine mammals, Sea turtles	BOEM, BSEE, and NMFS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
10	Construction and installation	Monitoring zone for sea turtles	BOEM, BSEE, and USACE would ensure that Revolution Wind monitors the full extent of the area where noise would exceed the 175 dB re 1 μPa^2 threshold for sea turtles for the full duration of all pile driving activities and for 30 minutes following the cessation of pile driving activities and record all observations in order to ensure that all take that occurs is documented.	Sea turtles	BOEM, BSEE, and USACE
11	Construction and installation, O&M, and conceptual decommissioning	Reporting of all NARW sightings	If a NARW is observed at any time by PSOs or personnel on any Project vessels, during any Project-related activity or during vessel transit, Revolution Wind must report the sighting information to NMFS as soon as feasible and no later than within 24 hours after conclusion of the detection event (the time, location, and number of animals) via the WhaleAlert app (http://www.whalealert.org/); NMFS Right Whale Sighting Advisory System hotline (phone); and PR.ITP.MonitoringReports@noaa.gov.	Marine mammals	BOEM and NMFS
12	Construction and installation, O&M, and decommissioning	Vessel strike avoidance measures for sea turtles	Between June 1 and November 30, Revolution Wind would have a trained lookout posted on all vessel transits during all phases of the Project to observe for sea turtles. The trained lookout would communicate any sightings, in real time, to the captain so that the requirements in (e) below can be implemented. a. The trained lookout would monitor https://seaturtlesightings.org/ prior to each trip and report any observations of sea turtles in the vicinity of the planned transit to all vessel operators/captains and lookouts on duty that day. b. The trained lookout would maintain a vigilant watch and monitor a Vessel Strike Avoidance Zone (500 m) at all times to maintain minimum separation distances from ESA-listed species. Alternative monitoring technology (e.g., night vision, thermal cameras, etc.) would be available to ensure effective watch at night and in any other low visibility conditions. If the trained lookout is a vessel crew member, this would be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts would receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. c. If a sea turtle is sighted within 100 m or less of the operating vessel's forward path, the vessel operator would slow down to 4 knots (unless unsafe to do so) and then proceed away from the turtle at a speed of 4 knots or less until there is a separation distance of at least 100 m at which time the vessel may resume normal operations. If a sea turtle is sighted within 50 m of the forward path of the operating vessel, the vessel operator would shift to neutral when safe to do so and then proceed away from the turtle at a speed of 4 knots. The vessel may resume normal operations once it has passed the turtle. d. Vessel captains/operators would avoid transiting through areas of visible jellyfish aggregations or floating sargassum lines or mats. In the event that operational safety prevents avoidance of such areas, vessels would slow to 4 knots while transiting through such areas. e. All vessel crew members would be briefed in the identification of ESA-listed species of sea turtles and in regulations and best practices for avoiding vessel collisions. Reference materials would be available aboard all Project vessels for identification of sea turtles. The expectation and process for reporting of sea turtles (including live, entangled, and dead individuals) would be clearly communicated and posted in highly visible locations aboard all Project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so. f. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements on an emergency basis. If any such incidents occur, they must be reported to NMFS and BSEE within 24 hours. g. If a vessel is carrying a PSO or trained lookout for the purposes of maintaining watch for North Atlantic right whales, an additional lookout is not required and this PSO or trained lookout must maintain watch for whales, giant manta rays, and sea turtles.	Sea turtles	BOEM, BSEE, and USACE

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
13	Construction and installation, post-construction and installation monitoring	Sampling gear	All sampling gear would be hauled out at least once every 30 days, and all gear would be removed from the water and stored on land between survey seasons to minimize risk of entanglement.	Finfish, marine mammals, sea turtles	BOEM and BSEE
14	Construction and installation, post-construction and installation monitoring	Lost survey gear	If any survey gear is lost, all reasonable efforts that do not compromise human safety would be undertaken to recover the gear. All lost gear would be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) and BSEE (OSWIncidentReporting@bsee.gov) within 24 hours of the documented time of missing or lost gear. This report would include information on any markings on the gear and any efforts undertaken or planned to recover the gear.	Finfish, marine mammals, sea turtles	BOEM, BSEE, and NMFS
15	Construction and installation, post-construction and installation monitoring	Training	At least one of the survey staff onboard the trawl surveys and ventless trap surveys would have completed NEFOP observer training (within the last 5 years) or other training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). Reference materials for identification, disentanglement, safe handling, and genetic sampling procedures would be available on board each survey vessel. BOEM and BSEE would ensure that Revolution Wind prepares a training plan that addresses how this requirement would be met and that the plan is submitted to NMFS in advance of any trawl or trap surveys. This requirement is in place for any trips where gear is set or hauled.	Finfish	BOEM, BSEE, and NMFS
16	Construction and installation, post-construction and installation monitoring	Sea turtle disentanglement	Vessels deploying fixed gear (e.g., pots/traps) would have adequate disentanglement equipment (i.e., knife and boathook) onboard. Any disentanglement would occur consistent with the Northeast Atlantic Coast STDN Disentanglement Guidelines at https://www.reginfo.gov/public/do/DownloadDocument?objectID=102486501 and the procedures described in "Careful Release Protocols for Sea Turtle Release with Minimal Injury" (NOAA Technical Memorandum 580; https://repository.library.noaa.gov/view/noaa/3773).	Sea turtles	BOEM, BSEE, and NMFS
17	Construction and installation, post-construction and installation monitoring	Sea turtle/Atlantic sturgeon identification and data collection	Any sea turtles or Atlantic sturgeon caught and/or retrieved in any fisheries survey gear would first be identified to species or species group. Each ESA-listed species caught and/or retrieved would then be properly documented using appropriate equipment and data collection forms. Biological data, samples, and tagging would occur as outlined below. Live, uninjured animals should be returned to the water as quickly as possible after completing the required handling and documentation. a. The Sturgeon and Sea Turtle Take Standard Operating Procedures would be followed (https://media.fisheries.noaa.gov/dammigration/sturgeon_&_sea_turtle_take_sops_external.pdf). b. Survey vessels would have a passive integrated transponder (PIT) tag reader onboard capable of reading 134.2 kHz and 125 kHz encrypted tags (e.g., Biomark GPR Plus Handheld PIT Tag Reader) and this reader be used to scan any captured sea turtles and sturgeon for tags. Any recorded tags would be recorded on the take reporting form (see below). c. Genetic samples would be taken from all captured Atlantic sturgeon (alive or dead) to allow for identification of the DPS of origin of captured individuals and tracking of the amount of incidental take. This would be done in accordance with the Procedures for Obtaining Sturgeon Fin Clips (https://media.fisheries.noaa.gov/dammigration/sturgeon_genetics_sampling_revised_june_2019.pdf). i. Fin clips would be sent to a NMFS approved laboratory capable of performing genetic analysis and assignment to DPS of origin. To the extent authorized by law, BOEM is responsible for the cost of the genetic analysis. Arrangements would be made for shipping and analysis in advance of submission of any samples; these arrangements would be confirmed in writing to NMFS within 60 days of the receipt of this ITS. Results of genetic analysis, including assigned DPS of origin would be submitted to NMFS within 6 months of the sample collection. ii. Subsamples of all fin clips and accompanying metadata forms would be held and submitted to a tissue repository (e.g., the Atlantic Coast Sturgeon Tissue Research Repository) on a	Finfish, Sea turtles	BOEM, BSEE, and NMFS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
			quarterly basis. The Sturgeon Genetic Sample Submission Form is available for download at: https://www.fisheries.noaa.gov/new-england- midatlantic/consultations/section-7-take-reporting-programmaticsgreater-atlantic). d. All captured sea turtles and Atlantic sturgeon would be documented with required measurements and photographs. The animal's condition and any marks or injuries would be described. This information would be entered as part of the record for each incidental take. A NMFS Take Report Form would be filled out for each individual sturgeon and sea turtle (download at: https://media.fisheries.noaa.gov/2021-41507/Take%20Report%20Form%20 07162021.pdf?null) and submitted to NMFS as described below.		
18	Construction and installation, post-construction and installation monitoring	Sea turtle/Atlantic sturgeon handling and resuscitation guidelines	Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys would be handled and resuscitated (if unresponsive) according to established protocols and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically: a. Priority would be given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used, if conditions at sea are safe to do so. Handling times for these species should be minimized (i.e., kept to 15 minutes or less) to limit the amount of stress placed on the animals. b. All survey vessels would have copies of the sea turtle handling and resuscitation requirements found at 50 CFR 223.206(d)(1) prior to the commencement of any on-water activity (download at: https://media.fisheries.noaa.gov/ dammigration/sea_turtle_handling_and_resuscitation_measures.pdf). These handling and resuscitation procedures would be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during the proposed actions. c. If any sea turtles that appear injured, sick, or distressed, are caught and retrieved in fisheries survey gear, survey staff would immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance on handling the animal, and potential coordination of transfer to a rehabilitation facility. If unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the USCG should be contacted via VHF marine radio on Channel 16. If required, hard-shelled sea turtles (i.e., non- leatherbacks) may be held on board for up to 24 hours following handling instructions provided by the Hotline, prior to transfer to a rehabilitation facility. d. Attempts would be made to resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the Sturgeon Resuscitation Guidelines (https://media.fisheries.noaa.gov/dammigration-miss/Resuscitation-Cards-120513.pdf). e. Provided that appropriate cold storage facilities are available on the survey vessel, following the report of a dead sea turtle or sturgeon to NMFS, and if NMFS requests, any dead sea turtle or Atlantic sturgeon would be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore as safe to do so. f. Any live sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey would ultimately be released according to established protocols and whenever at-sea conditions are safe for those releasing the animal(s) to do so.	Finfish, Sea turtles	BOEM, BSEE, and NMFS
19	Construction and installation, post-construction and installation monitoring	Take notification	GARFO PRD would be notified as soon as possible of all observed takes of sea turtles, and Atlantic sturgeon occurring as a result of any fisheries survey. Specifically: a. GARFO PRD would be notified within 24 hours of any interaction with a sea turtle or sturgeon (nmfs.gar.incidental- take@noaa.gov and BSEE at protectedspecies@bsee.gov). The report would include at a minimum: (1) survey name and applicable information (e.g., vessel name, station number); (2) GPS coordinates describing the location of the interaction (in decimal degrees); (3)	Finfish, Sea turtles	BOEM, BSEE, and NMFS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
			gear type involved (e.g., bottom trawl, gillnet, longline); (4) soak time, gear configuration and any other pertinent gear information; (5) time and date of the interaction; and (6) identification of the animal to the species level. Additionally, the e-mail would transmit a copy of the NMFS Take Report Form (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%20 07162021.pdf?null) and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via phone, fax, or email, reports would be submitted as soon as possible; late reports would be submitted with an explanation for the delay. b. At the end of each survey season, a report would be sent to NMFS that compiles all information on any observations and interactions with ESA-listed species. This report would also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, and total effort. The report on survey activities would be comprehensive of all activities, regardless of whether ESA-listed species were observed.		
20	Construction and installation, O&M, and decommissioning	Monthly/ annual reporting requirements	BOEM and BSEE would ensure that Revolution Wind submits regular reports (in consultation with NMFS) necessary to document the amount or extent of take that occurs during all phases of the proposed action. Details of reporting would be coordinated between Revolution Wind, NMFS, BOEM and BSEE. All reports would be sent to: nmfs.gar.incidental- take@noaa.gov and BSEE at OSWsubmittals@bsee.gov.	Finfish, marine mammals, sea turtles	BOEM, BSEE, and NMFS
21	Construction and installation, O&M, and decommissioning	Vessel strike avoidance plan measures	BOEM will require Revolution Wind to comply with measures and reporting outlined in the final Vessel Strike Avoidance Plan per the MMPA ITR LOA.	Marine mammals	BOEM, BSEE, and NMFS
BOEM-proposed Measures from the Data Collection and Site Survey Activities for Renewable Energy on the Atlantic OCS BA					
1	Construction and installation, O&M, and decommissioning	Data collection BA BMPs	BOEM and BSEE would ensure that all Project Design Criteria and Best Management Practices incorporated in the Atlantic Data Collection consultation for Offshore Wind Activities (June 2021) shall be applied to activities associated with the construction, maintenance and operations of the Revolution Wind Project as applicable.	Finfish, marine mammals, sea turtles	BOEM and BSEE
NMFS-proposed Measures to Minimize Impacts on Benthic Habitat					
1	Construction and installation	Scour and cable protection	BOEM should require scour and cable protection within complex habitats of the Lease Area to use natural, rounded stone of consistent grain size to match existing conditions. Scour and cable protection placed within soft-sediment habitats should incorporate natural, rounded cobble and boulders that does not inhibit epibenthic growth and provides three- dimensional complexity, both in height and in interstitial spaces, as technically and economically feasible. Concrete mattresses should not be permitted to be used as scour protection within hard bottom and structurally complex habitats, and any required use of concrete mattresses for cable protection should be mitigated through the addition of natural, rounded stone. Should the use of any engineered stone be necessary, it should be designed and selected to provide three-dimensional structural complexity that creates a diversity of crevice sizes. BOEM should require that the applicant provide descriptions and specifications for any proposed engineered stone for agency comment and review prior to final design selection.	Benthic habitat	BOEM and BSEE
Other Agency-proposed Mitigation Measures					

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
4	Construction and installation	Recreational fishing	BOEM and BSEE would ensure that Revolution Wind develops a construction schedule that minimizes overlap with recreational fishing tournaments and other important seasonal recreational fishing events.	Recreation and tourism	BOEM and BSEE
5	Construction, O&M	Vessel speed restriction	All vessels, regardless of size, would comply with a 10-knot speed restriction in any Seasonal Management Area (SMA), Dynamic Management Area (DMA), or Slow Zone.	Marine mammals, Sea turtles	BOEM and BSEE
6	Construction and installation	Safety zone during cable installation	BOEM and BSEE would ensure that Revolution Wind coordinates with the U.S. Coast Guard in advance of export cable installation to develop a navigation safety plan, which may include: establishing a safety zone around the cable laying vessel(s); monitoring plan; mitigation plan; schedule; private aids to navigation; and, local notice to mariners.	Navigation and vessel traffic	BOEM and BSEE
7	O&M	Post-installation cable monitoring	Revolution Wind must provide BOEM with a cable monitoring report within 45 calendar days following each inter-array and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the inter-array cable and export cable is expected to include HRG methods, such as a multi-beam bathymetric survey equipment, and identify seabed features, natural and man-made hazards, and site conditions along federal sections of the cable routing. In federal waters, the initial inter-array and export cable inspection would be carried out within 6 months of commissioning and subsequent inspections would be carried out at years 1, 2, and every 3 thereafter and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the Facility Design Report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review. In addition to inspection, the export cable would be monitored continuously with the as-built Distributed Temperature Sensing System. If Distributed Temperature Sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the Distributed Temperature Sensing data, a seabed stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations. The Distributed Temperature Sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the Annual Compliance Reports, required by 30 CFR § 585.633(b).	Benthic habitat, EFH, invertebrates, finfish, and commercial fisheries and for-hire recreational fishing	BOEM and BSEE
8	Construction, O&M, decommissioning	Submarine cable system burial plan	A copy of the submarine cable system burial plan shall be submitted by Revolution Wind as part of their Facility Design Report and Fabrication and Installation Report that depicts precise planned locations and burial depths of the entire cable system.	Navigation and vessel traffic	BOEM and BSEE
9	Construction	Boulder relocation reporting	The locations of any boulder (which would protrude >2 m or more on the sea floor) relocated during cable installation activities must be reported to BOEM, USCG, NOAA, and the local harbormaster.	Navigation and vessel traffic	BOEM and BSEE
10	Construction, O&M, decommissioning	Vessel safety practices	All Project vessels involved in construction, operations, maintenance, and decommissioning activities would comply with U.S. or international Safety of Life as Sea (SOLAS) standards, as applicable, with regards to vessel construction, vessel safety equipment, and crewing practices.	Navigation and vessel traffic	BOEM and BSEE
11	Construction, O&M, decommissioning	WTG shut-down mechanism	Equip all WTG rotors (blade assemblies) with control mechanisms to enable remote shut down of requested WTGs by the USCG. A formal shut-down procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shut downs would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG.	Other uses – military and national security	BOEM and BSEE
12	Construction, O&M, decommissioning	Adherence to federal survey mitigation guidance	BOEM is committed to working with NOAA Fisheries toward a long-term regional solution to account for changes in survey methodologies because of offshore wind farms. NOAA Fisheries and BOEM recently published (March 22, 2022) a draft Federal Survey Mitigation Implementation Strategy for the Northeast U.S. Region to address anticipated impacts of offshore wind energy development on NOAA Fisheries' scientific	Other uses – scientific research and surveys	BOEM, BSEE, and NMFS

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated	BOEM's Identification of the Anticipated Enforcing Agency[3]
			surveys. Activities described in the implementation strategy are designed to mitigate the effect of offshore wind energy development on NOAA Fisheries surveys and is referred to as the Federal Survey Mitigation Program. The mitigation program will include survey-specific mitigation plans for each affected survey including both vessel and aerial surveys. The implementation strategy is intended to guide the implementation of the mitigation program through the duration of wind energy development in the Northeast U.S. region and Revolution Wind will adhere to the measures suggested to the extent practicable. The measures from the published implementation strategy will be analyzed in the Final EIS.		
13	Construction, O&M	Environmental data sharing with federally recognized tribes	No later than ninety (90) days after COP approval, Revolution Wind must, at a minimum, contact the federally recognized tribes currently participating in government-to-government consultations with BOEM for the Project in order to solicit their interest in receiving access to the results of reports generated as a result of the Fisheries Research Monitoring Plan; reporting of all NARW sightings; injured or dead protected species reporting (turtles and NARW); NARW PAM monitoring; PSO reports (e.g., weekly pile driving reports); pile-driving schedule and changes thereto. At a minimum, Revolution Wind should offer access to the following federally recognized tribes: the Mashpee Wampanoag Tribe, the Wampanoag of Gay Head (Aquinnah); the Mashantucket Pequot Indian Tribe; the Narraganset Indian Tribe; and the Delaware Tribe of Indians. Revolution Wind must provide access to non-proprietary/non-confidential business information to the federally recognized tribes no later than 30 days after the information becomes available.	Environmental justice	BOEM
14	Construction and installation, O&M, conceptual decommissioning	Anchoring plan	Given the extent of complex habitats in the Project areas, BOEM should require the applicant to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats during construction and maintenance of the Project. This plan should specifically delineate areas of complex habitat around each turbine and cable locations, and identify areas restricted from anchoring. Anchor chains should include mid-line buoys to minimize impacts to benthic habitats from anchor sweep where feasible. The habitat maps and inshore maps delineating eelgrass habitat adjacent to the O&M facility should be provided to all cable construction and support vessels to ensure no anchoring of vessels be done within or immediately adjacent to these complex habitats. The anchoring plan should be provided for our review and comment prior to BOEM approval.	Benthic habitat, EFH, invertebrates, and finfish	BOEM and BSEE

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APPENDIX G

Environmental and Physical Settings and Supplemental Information

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

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Introduction

This appendix provides information on the environmental and physical settings of the Lease Area and information by resource or topic, as applicable, that supplements the information provided in the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project environmental impact statement (EIS).

Environmental and Physical Settings

This section addresses the physical, geological, and biological settings in the vicinity of the RWF and RWEC Project (the Project). As directed under Section 1501.12 of the Council on Environmental Quality's (CEQ's) revised National Environmental Policy Act (NEPA) regulations, this EIS incorporates, by reference, the detailed analysis provided in the Vineyard Wind final EIS in Appendix E (Bureau of Ocean Energy Management [BOEM] 2021).

For more specific environmental and physical setting information, the reader is referred to the following COP sections in the *Construction and Operations Plan Revolution Wind Farm* (COP) (vhb 2022):

- General regional setting: See Sections 4.6.7 and 4.3.1 of the COP. These sections describe current land uses and land cover types in the vicinity of the onshore Project components.
- Climate: See Section 4.2.1 of the COP. This section describes current air quality in the vicinity of the RWF and RWEC.
- Physical oceanography and meteorology: See Section 4.2.4 of the COP. This section provides detailed information on physical oceanographic conditions, including circulation, currents, and water column stratification by temperature and salinity, as well as meteorological conditions such as wind speed and direction, occurrence of storms and cyclones, and ice and fog. Few hurricanes pass through New England, but the area is subjected to frequent Nor'easters that form offshore between Georgia and New Jersey and typically reach maximum intensity in New England. These storms are usually characterized by winds from the northeast and can bring heavy precipitation, wind, storm surges, and rough seas. They primarily occur between September and April but can form any time of year. Although hurricanes are relatively infrequent in New England, wave heights up to 30 feet (9 meters [m]) were recorded south of Block Island (Scripps Buoy 44097) during Hurricane Sandy in 2012 (National Oceanic and Atmospheric Administration, National Weather Service 2012).
- Geological resources: See Section 4.2.3 of the COP. This section describes the regional geological setting as well as specific marine geophysical and geotechnical site investigations conducted for the RWF in accordance with BOEM regulations 30 CFR 585.
- Biological resources: See Sections 4.3.2 to 4.3.7 of the COP. These sections describe current types and status of terrestrial and marine resources in the vicinity of the RWF and RWEC.

Analysis of potential impacts to these resources from all offshore wind activities is provided in the EIS as part of each resource's No Action Alternative discussion. Discussion of impacts as a result of the Proposed Action references the No Action Alternative where possible to reduce replication and focus the

analysis to the differences among alternatives. EPMs and any other measures that would be implemented to monitor or minimize resource impacts are discussed in Appendix F.

Literature Cited

Bureau of Ocean Energy Management. 2021. *Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement*. OCS EIS/EA BOEM 2021-0012. Available at: https://www.boem.gov/vineyard-wind. Accessed June 2021.

National Oceanic and Atmospheric Association National Weather Service. 2012. *New England Effects from the Hurricane Sandy Hybrid Storm*. Available at: https://www.weather.gov /media/box/science/Sandy_summary_BOX.pdf. Accessed February 28, 2022.

vhb. 2022. *Construction and Operations Plan Revolution Wind Farm*. Revision 6: July. Submitted to Bureau of Ocean Energy Management. Available at: https://www.boem.gov/Revolution-Wind. Accessed June 1, 2021.

Avian and Bat Post-Construction Monitoring Framework

Revolution Wind, LLC (Revolution Wind) has developed a draft avian and bat post-construction monitoring plan for the Project that summarizes the approach to monitoring; describes overarching monitoring goals and objectives; identifies the key avian species, priority questions, and data gaps unique to the region and Lease Area that would be addressed through monitoring; and describes methods and time frames for data collection, analysis, and reporting (see COP Appendix AA [Biodiversity Research Institute 2021]). Post-construction monitoring would assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Project's avian risk assessment. Focus may be placed on improving knowledge of Endangered Species Act (ESA)–listed species occurrence and movements offshore, avian collision risk, species/species group displacement, or similar topics. Where possible, monitoring conducted by Revolution Wind would build on and align with post-construction monitoring conducted by the other Orsted/Eversource offshore wind projects in the Northeast region. Revolution Wind would engage with federal and state agencies and environmental groups to identify appropriate monitoring options and technologies and to facilitate acceptance of the final avian and bat post-construction monitoring plan (see COP Appendix AA [Biodiversity Research Institute 2021]).

The content of the draft *Revolution Wind Avian and Bat Post-Construction Monitoring Framework* is provided below and is a direct excerpt from the *Assessment of the Potential Effects of the Revolution Offshore Wind Farm on Birds and Bats* (COP Appendix AA [Biodiversity Research Institute 2021:232–236]). Full references supporting this excerpt's author-year citations can be found in COP Appendix AA.

Introduction

Revolution Wind LLC (Revolution Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the RWF and the RWEC, collectively the Revolution Wind Farm Project (hereinafter referred to as the Project). The wind farm portion of the Project will be in Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486 (Lease Area), southeast of Point Judith, Rhode Island, and east of Block Island, Rhode Island. The Project's generating capacity will range between 704

megawatts (MW) and 880 MW. This RWF Avian and Bat Post-Construction Monitoring Framework (hereafter the "Framework") focuses solely on the offshore footprint of the Project within the Lease Area, and does not apply to the offshore export cable, cable landfall, or onshore portions of the Project.

Revolution Wind has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of bird and bat interactions with offshore wind farms. The scope of monitoring is designed to meet federal requirements [30 CFR 585.626(b)(15) and 585.633(b)] and is scaled to the size and risk profile of the Project with a focus on species of conservation concern.

The intent of the Framework is to outline overarching monitoring objectives, monitoring questions, proposed monitoring elements, and reporting requirements. A detailed Avian and Bat Post-Construction Monitoring Plan (Monitoring Plan), based on this Framework, will be developed in coordination with BOEM, U.S. Fish and Wildlife Service (USFWS), and other relevant regulatory agencies prior to beginning monitoring. Where feasible, monitoring conducted at the RWF will be coordinated with monitoring at neighboring Orsted/Eversource offshore wind projects—South Fork Wind Farm (SFWF) and Sunrise Wind Farm (SRWF)—to facilitate integrated analyses across a broader geographic area.

Monitoring objectives, questions, and associated methods are summarized in Table G-AB1. Technical approaches were selected based on offshore logistical constraints, their ability to address monitoring objectives, and their effectiveness in the marine environment. Emerging technologies, such as multi-sensor radar/camera collision detection systems, are not proposed under this Framework because they have not yet been broadly deployed offshore or demonstrated to effectively reduce uncertainties related to potential impacts on birds and bats.

Table G-AB1. Monitoring Objectives, Questions, General Approaches to be Used, and Duration

Taxa	Monitoring Objective	Primary Questions	Approach	Duration
Bats	Monitor occurrence of bats	What times of year and under what environmental conditions are bats detected in the wind farm?	Acoustics	2 years
Birds	Monitor use by ESA listed birds	What times of year and under what conditions are ESA birds present in the wind farm?	Radio tags	up to 3 years
Birds	Monitor use by nocturnal migratory birds	What are the flux rates and flight heights of nocturnally migrating birds?	Radar	1-2 years
Birds	Monitor movement of marine birds around the turbines	What are the avoidance rates of marine birds?	Radar	1-2 years

Both	Document mortality	What dead or injured species are found incidentally?	Incidental observations	Project lifetime

Bat Acoustic Monitoring

The presence of bats in the marine environment has been documented in the U.S. (Hatch et al. 2013, Solick and Newman 2021). However, there remains uncertainty regarding the extent to which bats occur offshore, particularly within offshore wind farms. Acoustic detectors are commonly used to study bat movements and migration (Johnson et al. 2011). Following the approach taken at SFWF (Final Environmental Impact Statement Appendix F[1]), Orsted/Eversource would conduct bat acoustic monitoring to assess bat activity at RWF, targeting key data gaps related to species presence/composition, temporal patterns of activity, and correlation with weather and atmospheric conditions. The primary monitoring questions are: What times of year and under what environmental conditions are bats detected in the wind farm?

Acoustic monitoring of bat presence would be conducted for two years post-construction. A detector would first be tested onsite to determine if there is any sound interference. Contingent on a successful test, ultrasonic bat detector stations would be installed on the offshore convertor station, wind turbine platforms, and/or buoys. The specific number and location of detector stations would be selected to optimize study design goals, and would be determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. While specific timing would be dictated by logistics, detectors would likely be deployed in the early spring or late winter (March), and removed in the late fall or early winter (December) after migration, or the most appropriate period as determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. The detectors would record calls of both cave-hibernating bats, including the northern long-eared bat (Myotis septentrionalis), and migratory tree bats; the resulting information can be used to identify bats to species. All acoustic data recorded would be processed with approved software to filter out poor quality data and identify the presence of bat calls. Where information is insufficient to make a species identification, calls would be classified to one of two phonic groups: low frequency bats (LoF), or high frequency bats (HiF). The HiF group includes both migratory tree bats and cave hibernating bats. Since HiFi include the ESA-listed northern long-eared bat, they would then be manually vetted by an experienced acoustician to the highest resolution possible (e.g., species or genus).

All bat calls detected and identified would be analyzed to understand relationships with time of day, season, and weather/atmospheric conditions. The results would provide information on bat presence offshore and the conditions under which they may occur near offshore wind turbines.

[1] https://www.boem.gov/renewable-energy/state-activities/south-fork

Motus Tracking Network and ESA Use Study

Tracking studies indicate that at least some individual ESA-listed Piping Plovers (*Charadrius melodus*), Red Knots (*Calidris canutus rufa*), and Roseate Terns, may pass through the Rhode Island and Massachusetts lease areas (Loring et al. 2018, 2019). However, due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (hereafter, Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Revolution Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. The exact species being studied would be determined in consultation with federal agencies and would be dependent on existing, ongoing field efforts. The Motus receivers would also provide opportunistic presence/absence data on other species carrying Motus tags, such as migratory songbirds and bats. The primary monitoring questions are: What times of year and under what environmental conditions are ESA birds present in the wind farm?

Movements of radio-tagged ESA-listed birds in the vicinity of the RWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project[2]. If there is a need identified by USFWS and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the RWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to RWF. Funding for up to 150 Motus tags per year would be provided to researchers working with ESA-listed birds for up to three consecutive years.

ESA-listed bird presence/absence in the wind farm would be analyzed by comparing detections within the wind farm to coastal receiver towers. All detections would be analyzed to understand relationships with time of day, season, and weather.

Radar Monitoring: Nocturnal Migrants Flux and Flight Heights

Nocturnal migrants, including songbirds and shorebirds, are documented to fly offshore (Adams et al. 2015, Loring et al. 2020). Since nocturnal migration events are episodic and cannot be detected during daytime surveys, there is uncertainty on the timing and intensity of migration offshore. Radar, oriented vertically, has been used at offshore wind farms in Europe to study nocturnal migration events (Hill et al. 2014). Orsted/Eversource is considering conducting a one-to-two-year radar study across SRWF, SFWF, and RWF

[2] https://www.briloon.org/renewable/automatedvhfguidance

to record the passage rates (flux) of migrants and flight heights. The primary monitoring questions are: What are the flux rates and flight heights of nocturnally migrating birds?

Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. The results would be related to time of year and weather conditions, to increase the understanding on when nocturnal migrants may have higher collision risk.

Radar Monitoring: Marine Bird Avoidance

Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to Orsted/Eversource's large turbines that would be spaced one nautical mile apart. Based on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, Orsted/Eversource is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. The primary monitoring questions is: What are the avoidance rates of marine birds?

Documentation of Dead and Injured Birds and Bats

Revolution Wind, or its designated operator, would implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location would be marked using GPS, an Incident Reporting Form would be filled out, and digital photographs taken. Any animals detected that could be ESA-listed, would have their identity confirmed by consulting biologists, and a report would be submitted to the designated staff at Revolution Wind who would then report it to BOEM, USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags would be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and USFWS.

Adaptive Monitoring

Adaptive monitoring is an important principle underlying Revolution Wind's post-construction monitoring Framework. Over the course of monitoring, Revolution Wind would work with BOEM, USFWS, and other relevant regulatory agencies, to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring results. Potential triggers for adaptive monitoring may include, but not be limited to, equipment failure, an unexpected impact to birds or bats identified through monitoring, or new opportunities to collaborate with other projects in the region. The Monitoring Plan would include a series of potential adaptive monitoring actions,

developed in coordination with BOEM, USFWS, and other relevant regulatory agencies, to be considered as appropriate.

Reporting

Revolution Wind would submit an annual report to BOEM and USFWS summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. Revolution Wind would participate in an annual meeting with BOEM and USFWS to discuss the report. (Biodiversity Research Institute 2021:232–236)

Literature Cited

Biodiversity Research Institute (bri). 2021. *Assessment of the Potential Effects of the Revolution Wind Offshore Wind Farm on Birds and Bats*. *Lease Area OCS-A-0486*. Appendix AA in *Construction and Operations Plan Revolution Wind Farm*. Portland, Maine: bri. April.

Commercial Fisheries and For-Hire Recreational Fishing

Information in this section provides an overview of the commercial fisheries data used in EIS Section 3.9. It also provides a description of the methodological approach used to describe the dependency of fishermen on the Lease Area.

Overview of Commercial Fisheries Data Used in the Environmental Impact Statement Section 3.9

The primary source of data was summarized vessel trip report (VTR) data provided by the National Marine Fisheries Service (NMFS) (2021a). Included were annual VTR data (2008–2019) for specific geographic areas relevant to the Project showing commercial fishing revenue, trips, and number of unique vessels for each fishery management plan (FMP) fishery, species, gear, and port of landing.[3] These data were also used to analyze the distribution of commercial fishing revenue from the Lease Area across fishing vessels. In addition, the VTR data provided by NMFS (2021a) described the activities of for-hire recreational fishing vessels, including landings by species and the number of angler trips by port.

A second source of data was the website at NMFS (2021b), which summarizes commercial fisheries data for each proposed WEA along the U.S. Atlantic Coast. These data were downloaded and used to summarize revenue at risk across all proposed offshore wind projects under the No Action Alternative.

[3] NMFS requires all federally permitted commercial fishing vessels (with the exception of those vessels that only have a lobster permit) to submit a VTR for every fishing trip (50 CFR 648.7). The VTR data provide a broad census of fishing activity that encompasses the majority of commercial fisheries active near the RWF and offshore RWEC. VTRs include a single fishing location (reported in latitude and longitude coordinates) for each trip. VTR location information is only an approximation of fishing activity, particularly with respect to the use of mobile gear, because fishermen self-report only one set of coordinates for a fishing trip, despite the fact that one trip may include multiple gear tows that take place in many different locations across a much wider area. VTR instructions require that fishermen record the haulback position where most of the fishing occurred (Livermore 2017; NMFS 2020a).

A fisherman with a vessel with a federal lobster permit is only required to fill out a VTR if he or she has another federal permit. Approximately 63% of the lobster fleet fishing in statistical area 537, which encompasses most of the RI/MA WEAs, reports through VTRs (Atlantic States Marine Fisheries Commission 2018).

In addition, polar histograms (Figure 3.9-3 through Figure 3.9-5) developed by BOEM based on NMFS vessel monitoring system (VMS) data provided by NMFS (2019) are included in Section 3.9. [4] From January 2014 through August 2019, VMS coverage levels ranged between 90% and 100% for the following FMP fisheries: Atlantic Herring; Bluefish; Mackerel, Squid, and Butterfish; Monkfish; Northeast Multispecies (large-mesh); Northeast Multispecies (small-mesh); Sea Scallop; Spiny Dogfish; Summer Flounder, Scup, and Black Sea Bass; and Surfclam and Ocean Quahog. Average VMS coverage levels were lower for the following FMP fisheries: Skate (75%); Highly Migratory Species (48%); Jonah Crab (14%); and American Lobster (11%) (NMFS 2019).

Average Annual Revenues and Non-Disclosure Issues

In general, Section 3.9 provides information on the average annual revenue over the 2008–2019 period. However annual data were provided only for the years for which data could be disclosed. If an annual data-point for a given FMP, gear, or port within a given geographic area could not be disclosed because there were an insufficient number of vessels or dealers, then NMFS added the datapoint to a "non-disclosed" category. By combining all the datapoints that could not be disclosed, NMFS was able to report to the annual total revenue for every year. However, this methodology for reporting non-disclosed data points hampers accurate estimation of average annual revenue because there were often non-disclosed data for one or more years, particularly if the geographic area is small or if there were relatively low levels of participation. Table G-1 is provided to demonstrate these issues. The table shows the annual data for gears as provided by NMFS for the RWEC from 2008 to 2019. It is not possible to infer whether numbers shown as zero (with a "–") denote zero revenue for the gear or that the data were not disclosed and assigned to the "All Other Gear" category.

Table G-1. National Marine Fisheries Service-Greater Atlantic Regional Fisheries Office Commercial Fishing Annual Revenue Data for the Lease Area

Gear	2008 ($1000s)	2009 ($1000s)	2010 ($1000s)	2011 ($1000s)	2012 ($1000s)	2013 ($1000s)	2014 ($1000s)	2015 ($1000s)	2016 ($1000s)	2017 ($1000s)	2018 ($1000s)	2019 ($1000s)	Non-Zero Years
Dredge-Scallop	$10.8	$5.6	$2.8	$14.4	–	$5.3	$8.3	$17.8	$20.6	$6.1	$4.8	$11.0	11
Gillnet-Sink	$35.3	$38.7	$49.3	$38.3	$24.3	$22.9	$24.7	$20.8	$25.8	$25.8	$15.5	$15.9	12
Handline	$1.4	$1.1	$0.8	$0.8	$0.7	$0.5	$1.3	$0.5	$1.1	$1.7	$1.4	$1.4	12
Pot-Lobster	$139.3	$105.5	$91.8	$70.1	$79.0	$50.8	$52.8	$55.6	$55.3	$49.8	$65.1	$89.3	12
Pot-Other	$2.0	$3.2	$17.5	$21.2	$12.9	$10.5	$5.1	$6.5	$11.0	$9.5	$20.1	$15.0	12
Trawl-Bottom	$115.5	$114.2	$139.7	$185.9	$263.6	$237.5	$191.6	$205.3	$187.3	$150.4	$155.1	$182.8	12

[4] VMS data are generated from automated transmissions from transponders that are required to be on board and operating whenever permitted vessels are fishing or transiting with the intent to harvest fish or shellfish. Data are transmitted once every 60 minutes for all FMPs except sea scallops, which are transmitted once every 30 minutes. Each transmission includes the current directional bearing and vessel speed as well as the average bearing and vessel speed since the last transmission. Using the average vessel speed, NMFS uses an algorithm to assign an assumed activity (either fishing or transiting) to each transmission.

Gear	2008 ($1000s)	2009 ($1000s)	2010 ($1000s)	2011 ($1000s)	2012 ($1000s)	2013 ($1000s)	2014 ($1000s)	2015 ($1000s)	2016 ($1000s)	2017 ($1000s)	2018 ($1000s)	2019 ($1000s)	Non-Zero Years
Trawl-Midwater	$8.3	$43.9	$7.9	$37.9	$131.8	$100.3	$125.6	$51.6	$36.9	$0.7	–	–	10
Dredge-Scallop	$10.8	$5.6	$2.8	$14.4	–	$5.3	$8.3	$17.8	$20.6	$6.1	$4.8	$11.0	11
Dredge-Clam	–	$7.8	–	–	–	$0.9	–	–	–	–	–	–	2
Longline-Bottom	–	–	–	–	–	$0.1	$0.1	–	–	–	–	–	2
All other gear*	$17.8	$10.6	$13.0	$12.0	$7.3	$0.1	$3.8	$27.6	$16.3	$6.5	$3.2	$19.6	12
All gear types	$341.3	$336.3	$325.5	$395.0	$519.7	$434.1	$421.7	$403.5	$374.7	$256.5	$270.0	$345.8	$0.1

Source: NMFS (2022).

Notes: Revenue is adjusted for inflation to thousands of 2019 dollars. ND = not disclosed. A "–" indicates a value equal to zero, while $0.0 indicates a value greater than zero, but less than $500.

Commercial Fisheries Revenue Intensity Figures

The revenue intensity figures for commercial fisheries shown in Figures G-1 through G-13 have been developed to provide a visual representation of harvesting locations across FMP fisheries. These figures are reproduced from the Fishing Footprints webpage (NMFS 2020b) with the addition of the Lease Area and the RWEC superimposed. The figures provided are generally limited to those that are available for the years 2016 through 2018, although an exception is made for Figure G-13, which summarizes the revenue intensity of all fisheries combined and which is provided for the years 2013 through 2015 (the most recent data available on the webpage).

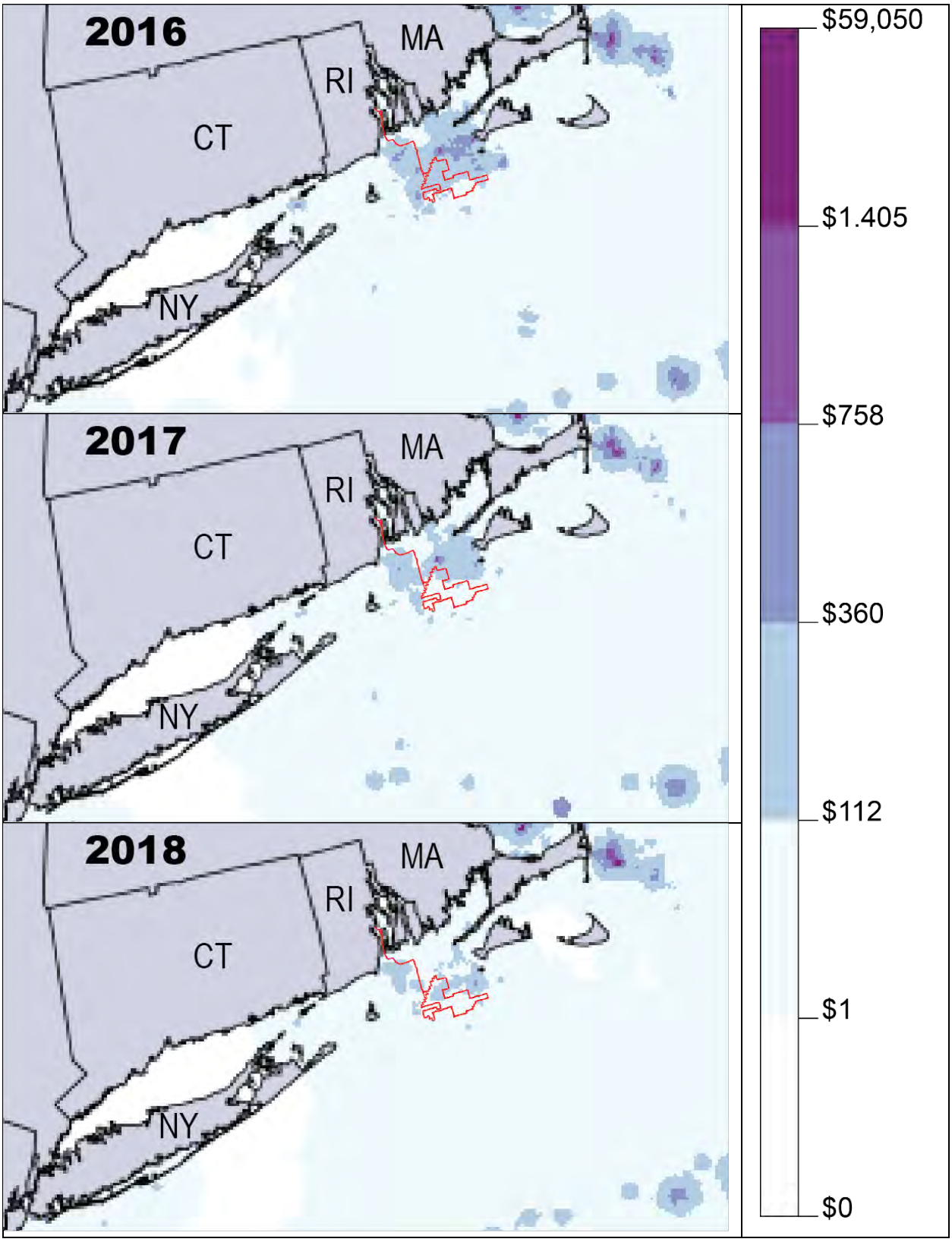

Figure G-1. Revenue Intensity for the American Lobster Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

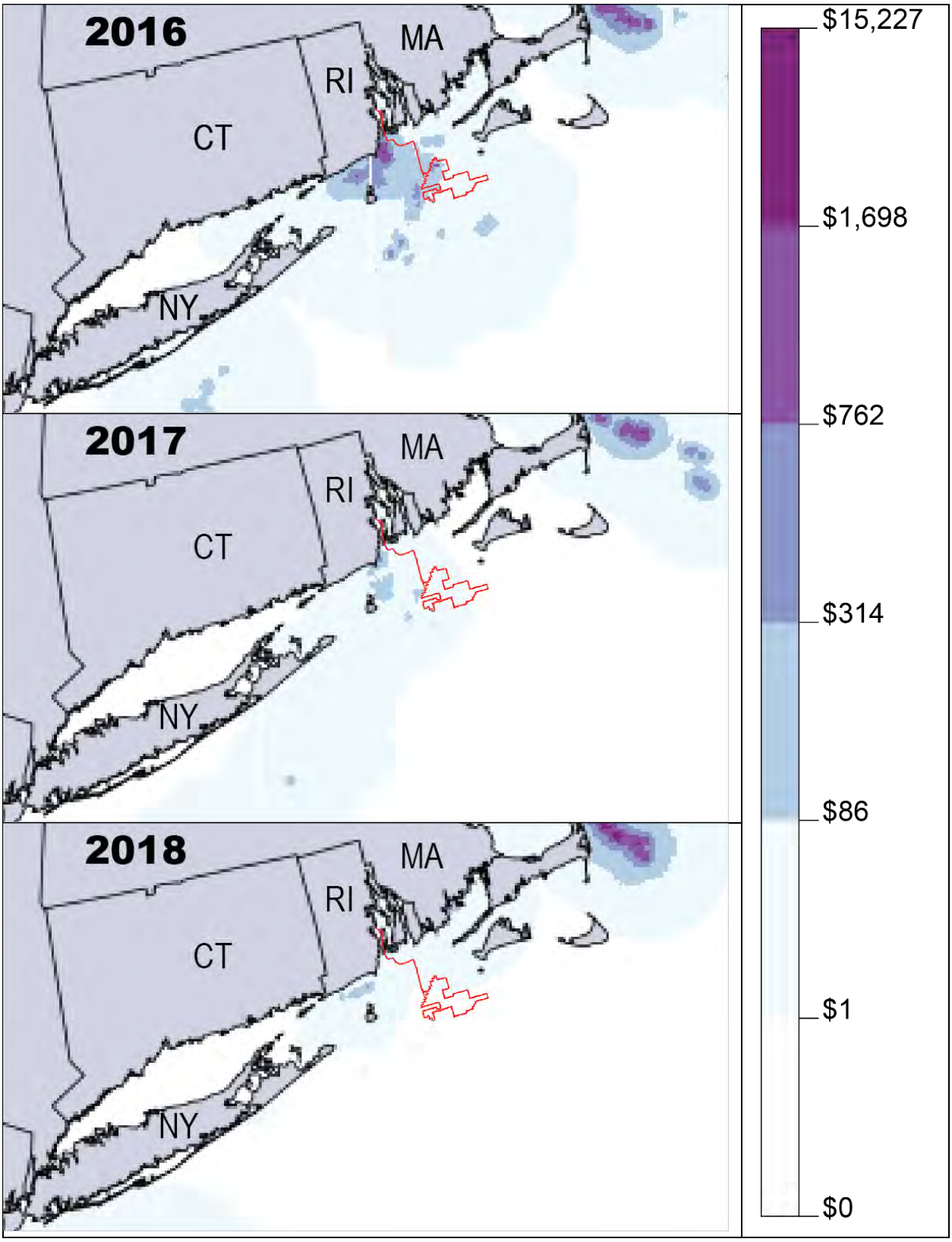

Figure G-2. Revenue Intensity for the Atlantic Herring Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

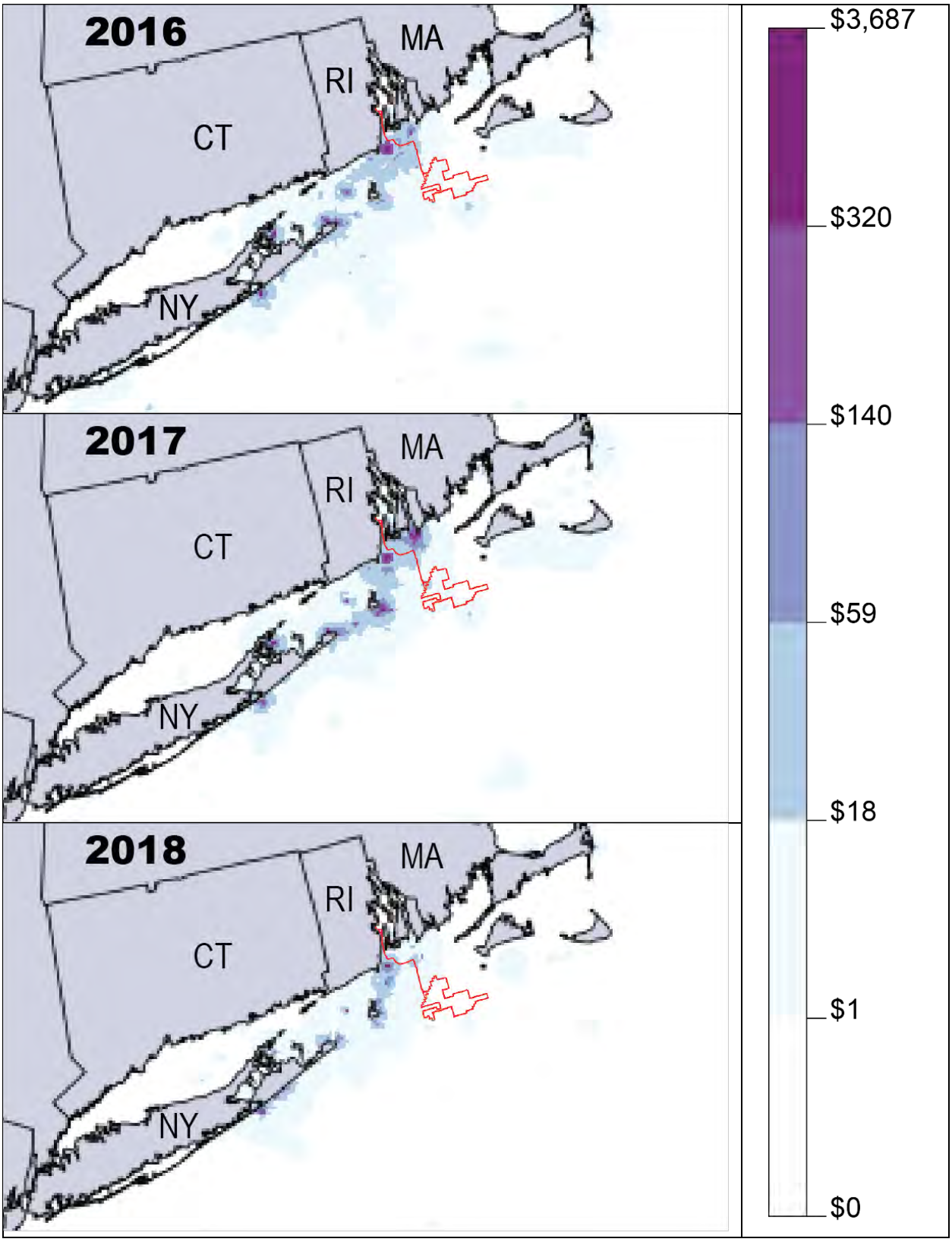

Figure G-3. Revenue Intensity for the Bluefish Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

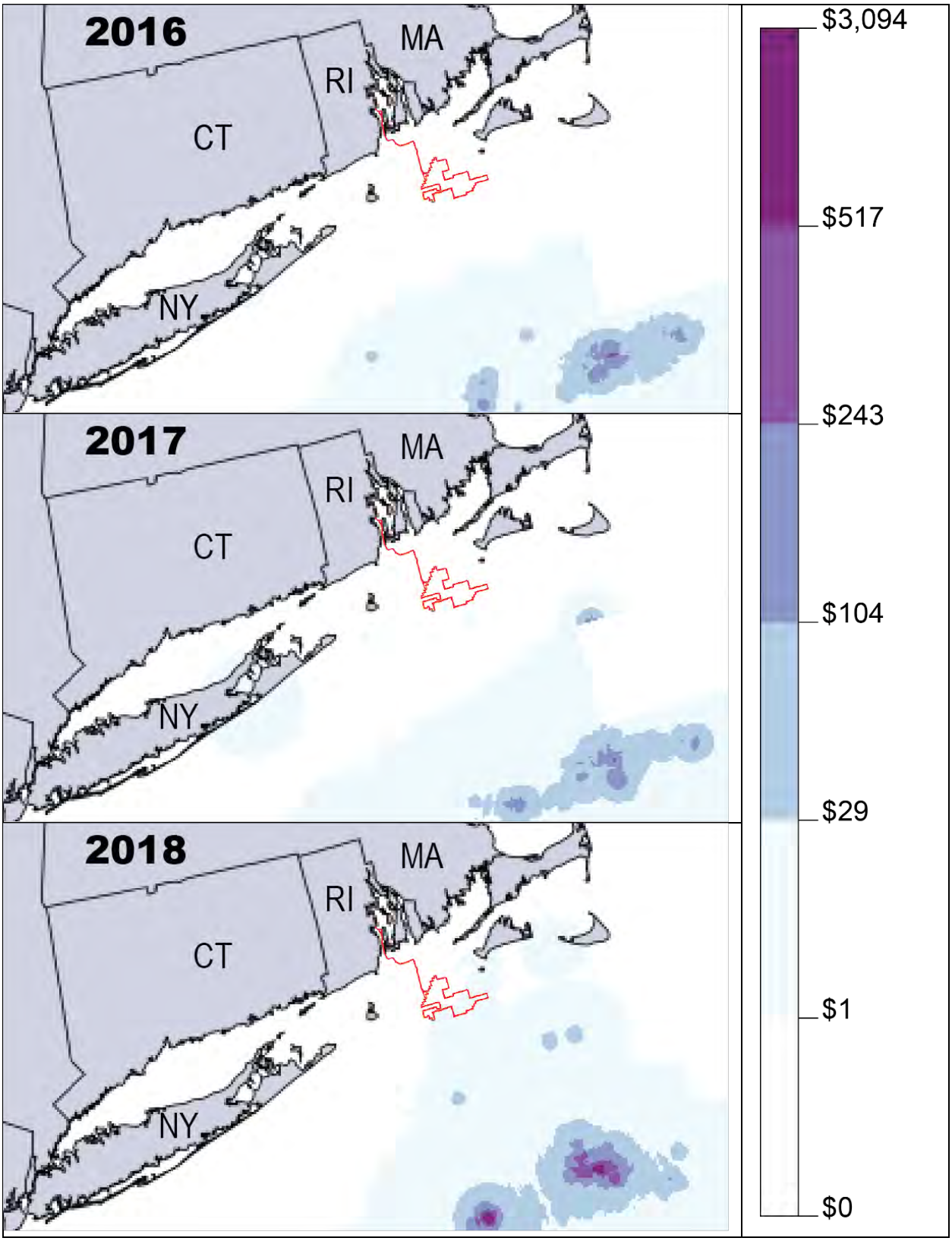

Figure G-4. Revenue Intensity for the Golden Tilefish Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

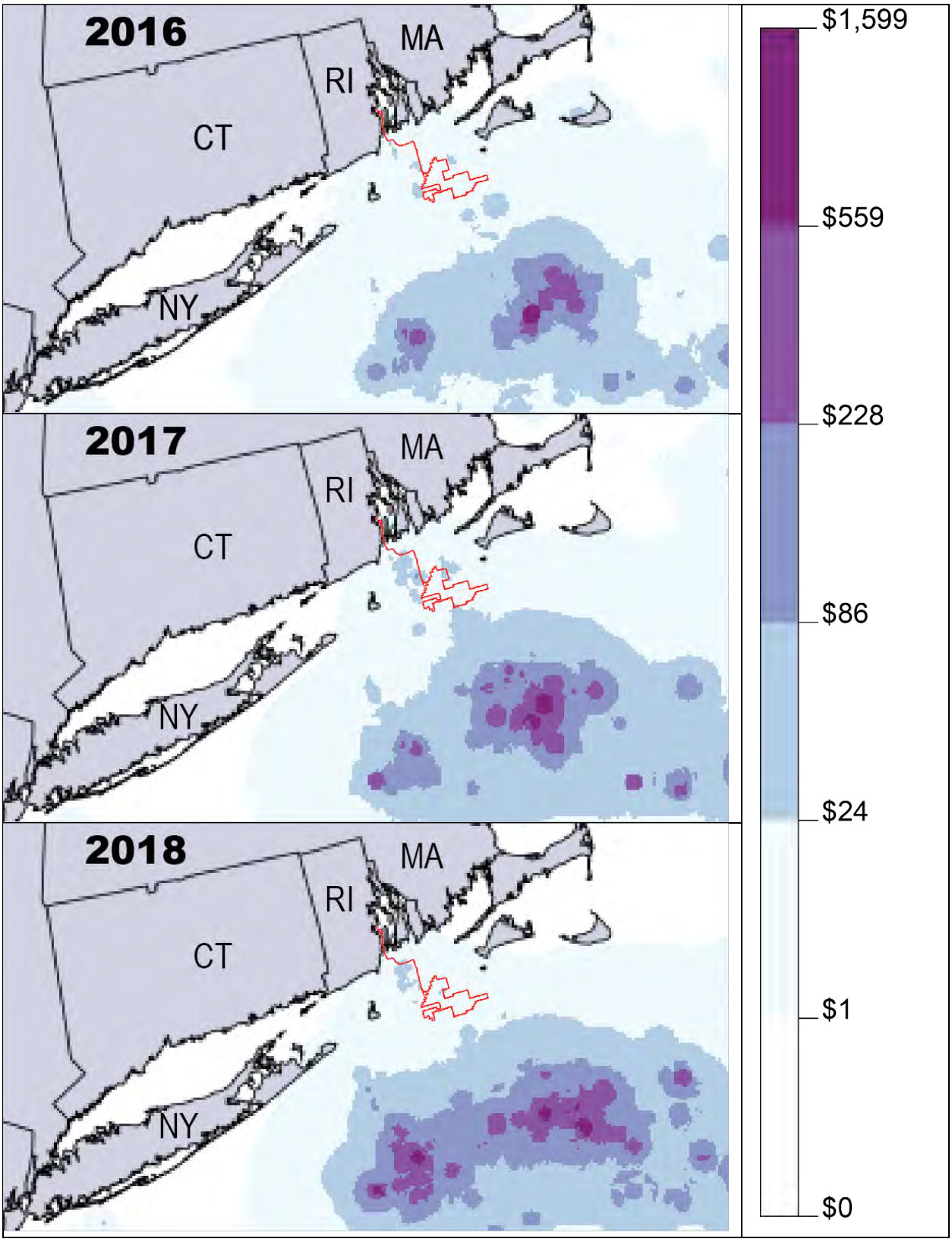

Figure G-5. Revenue Intensity for the Jonah Crab Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

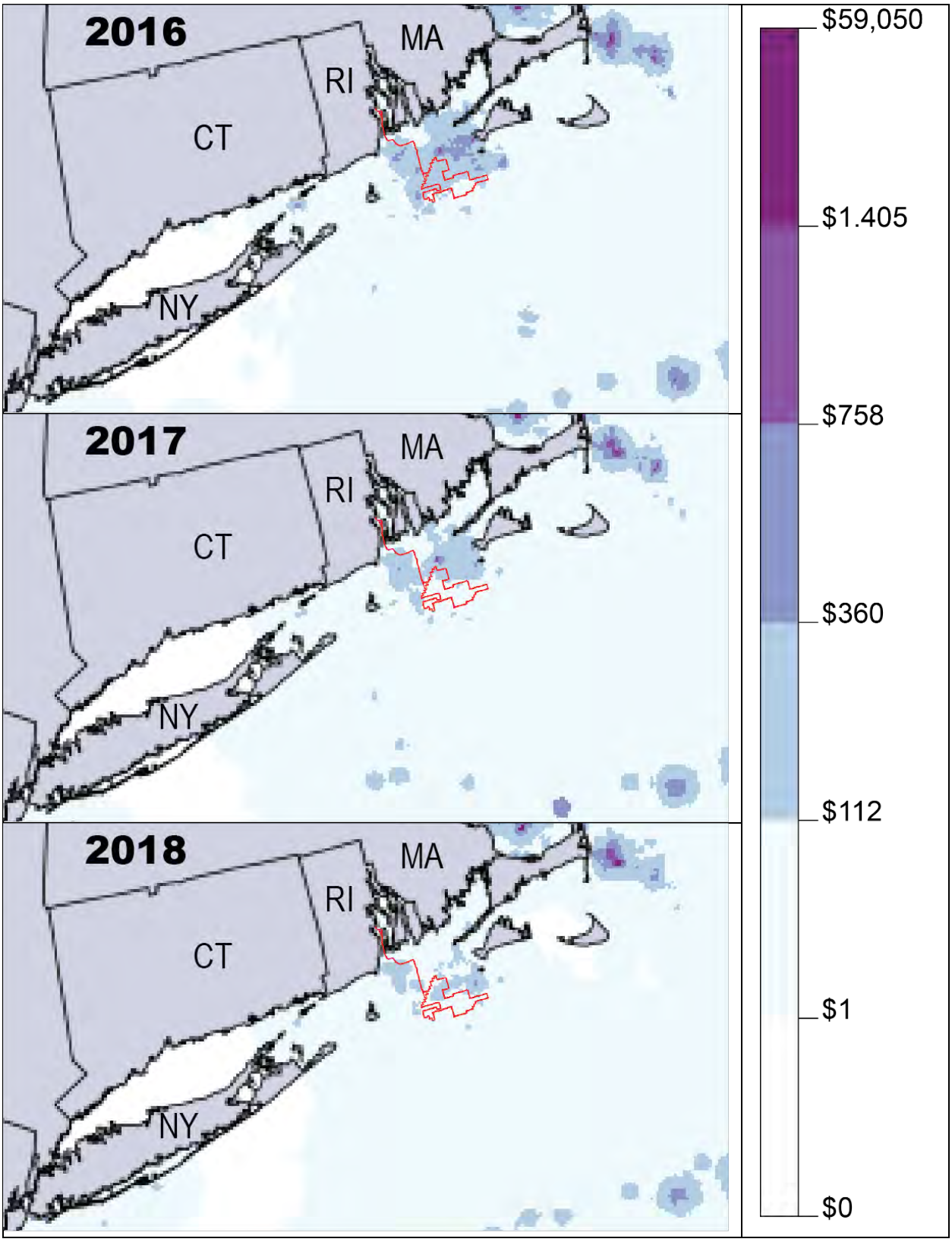

Figure G-6. Revenue Intensity for the Mackerel, Squid, and Butterfish Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

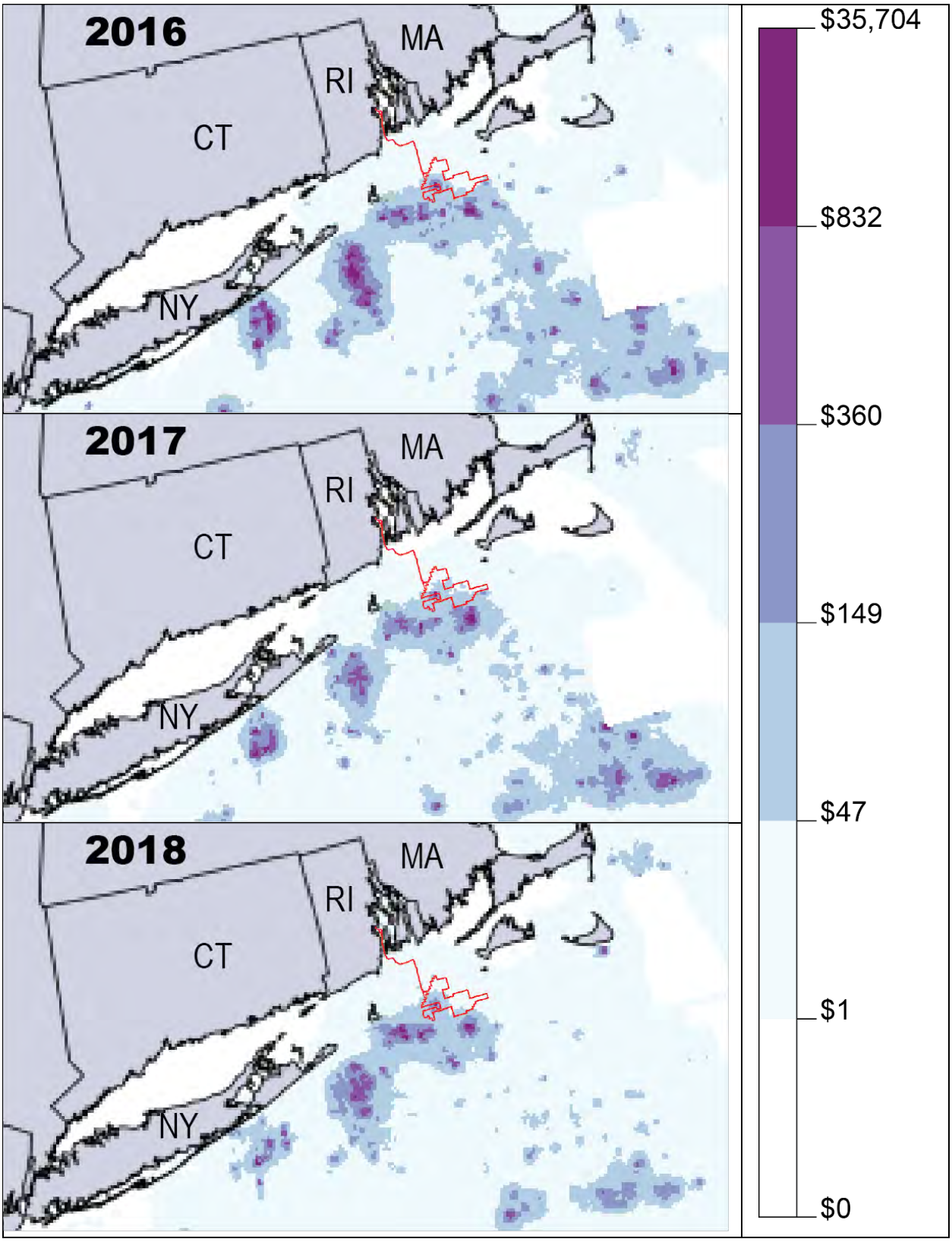

Figure G-7. Revenue Intensity for the Monkfish Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

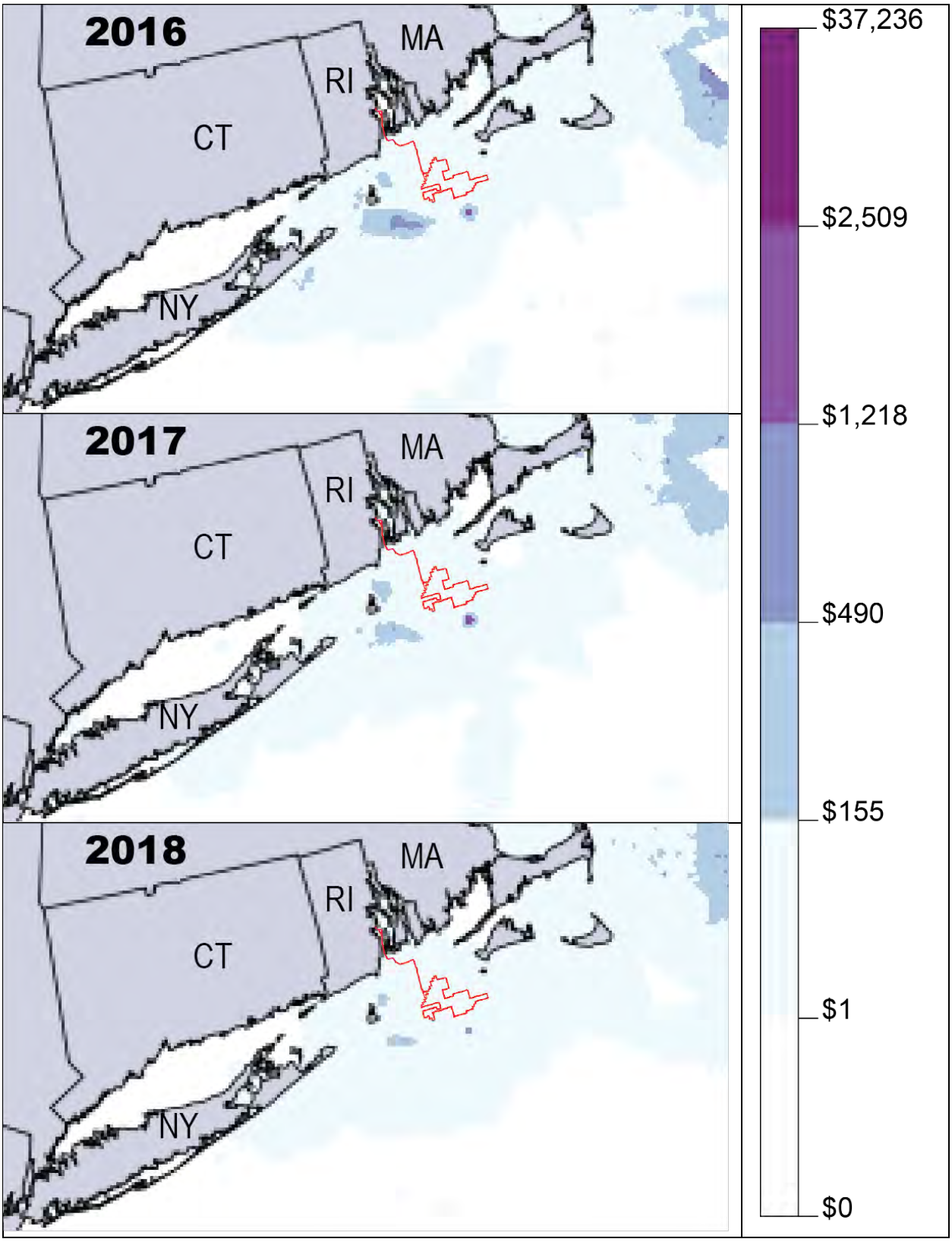

Figure G-8. Revenue Intensity for the Northeast Multispecies (large-mesh) Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

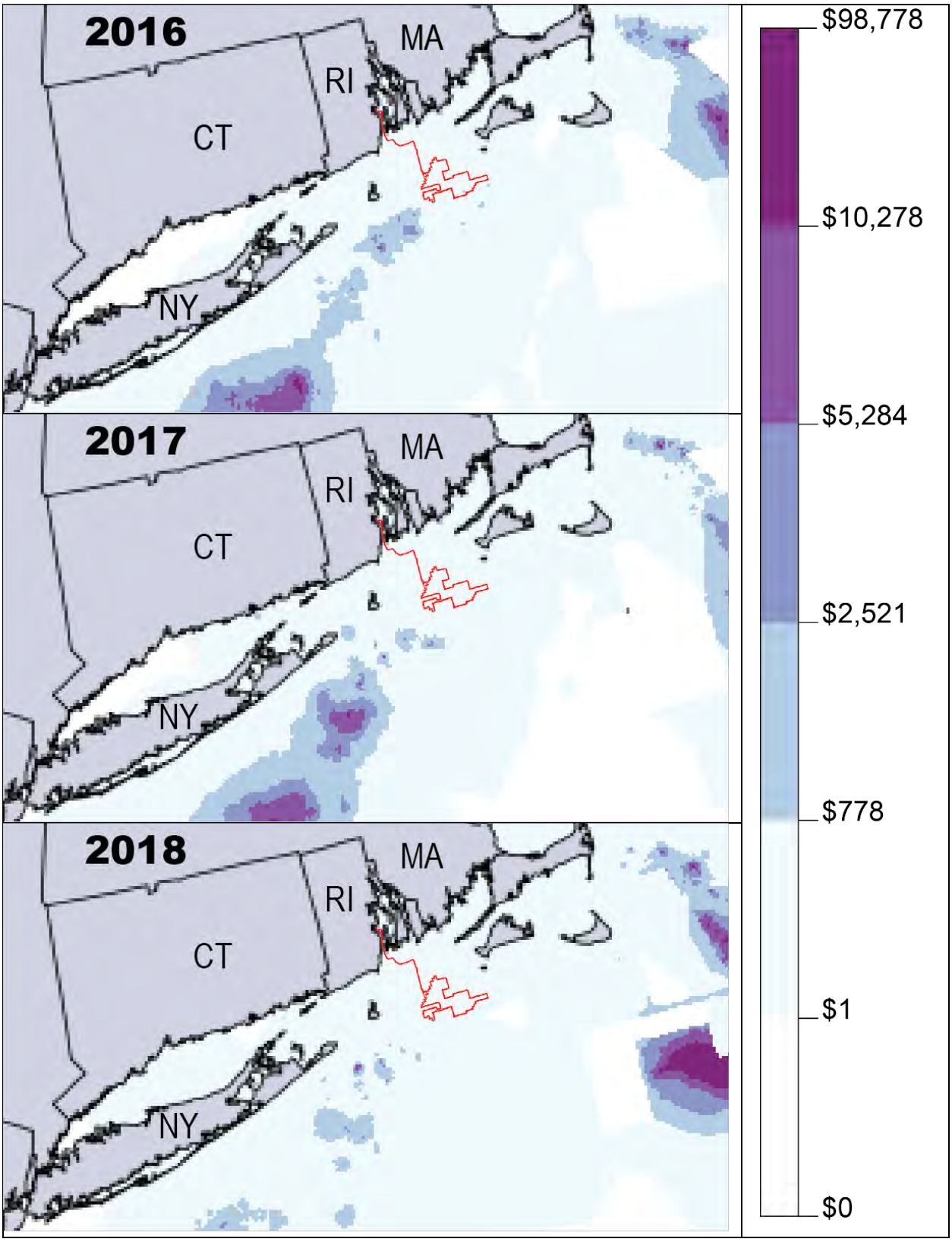

Figure G-9. Revenue Intensity for the Sea Scallop Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

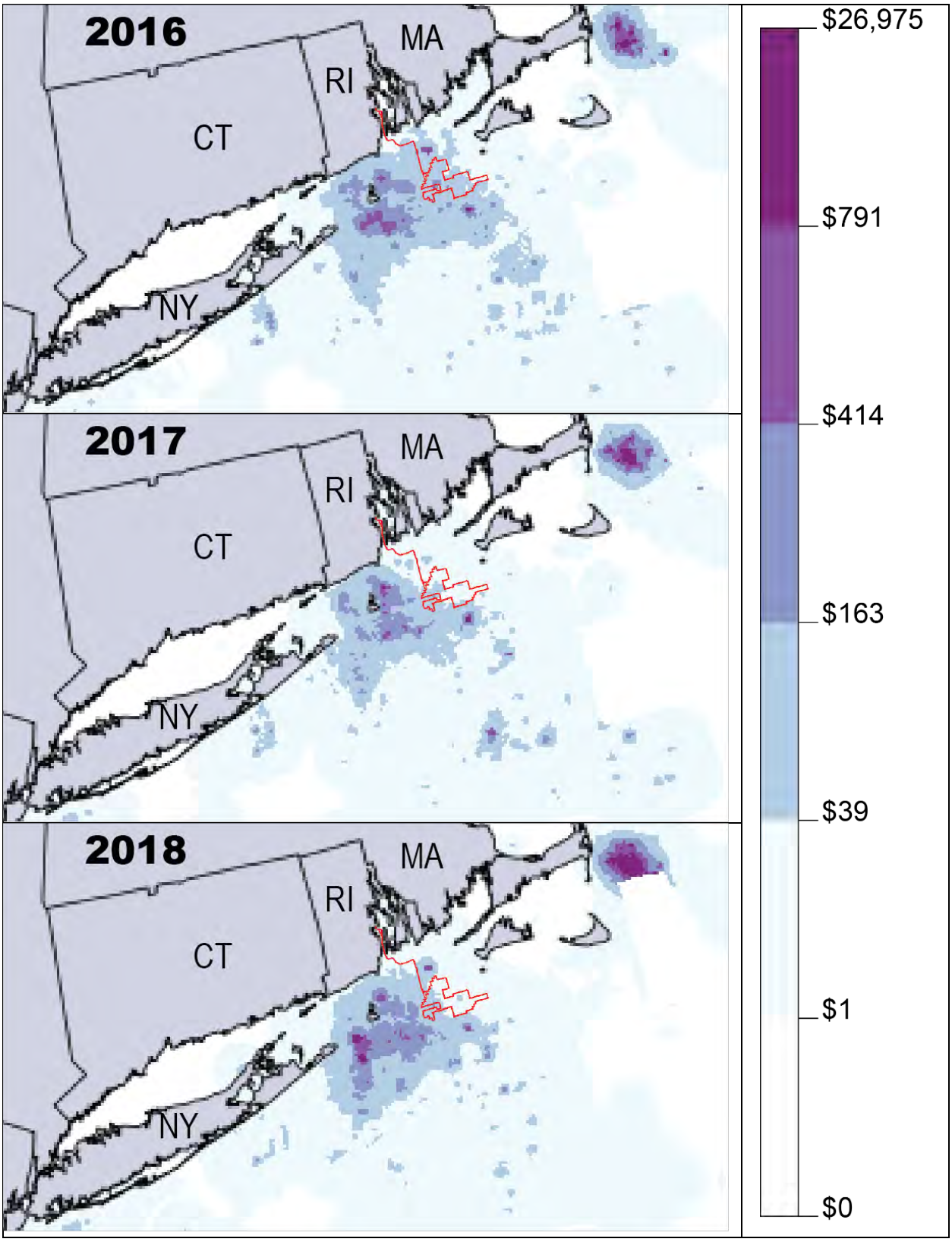

Figure G-10. Revenue Intensity for the Skate Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

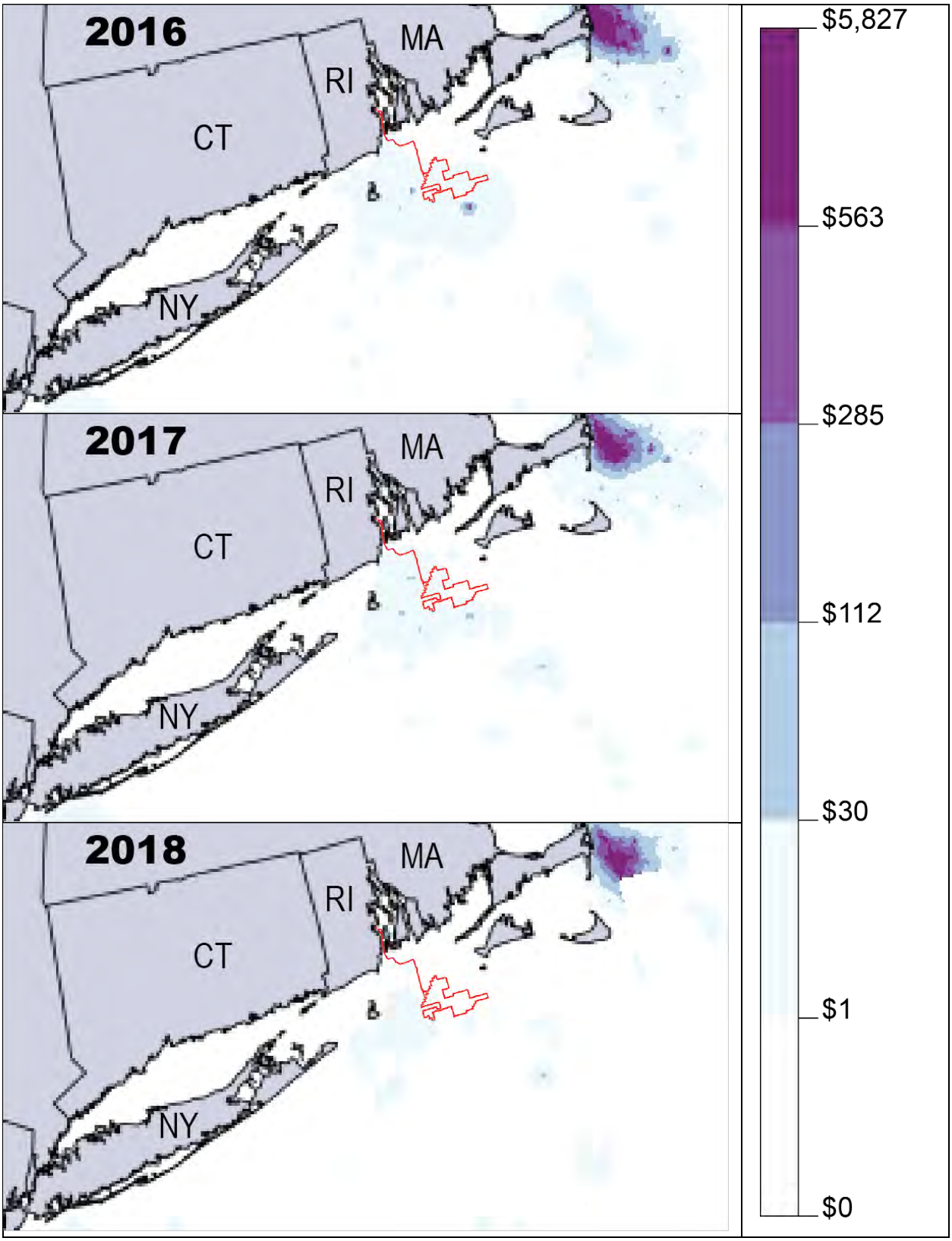

Figure G-11. Revenue Intensity for the Spiny Dogfish Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

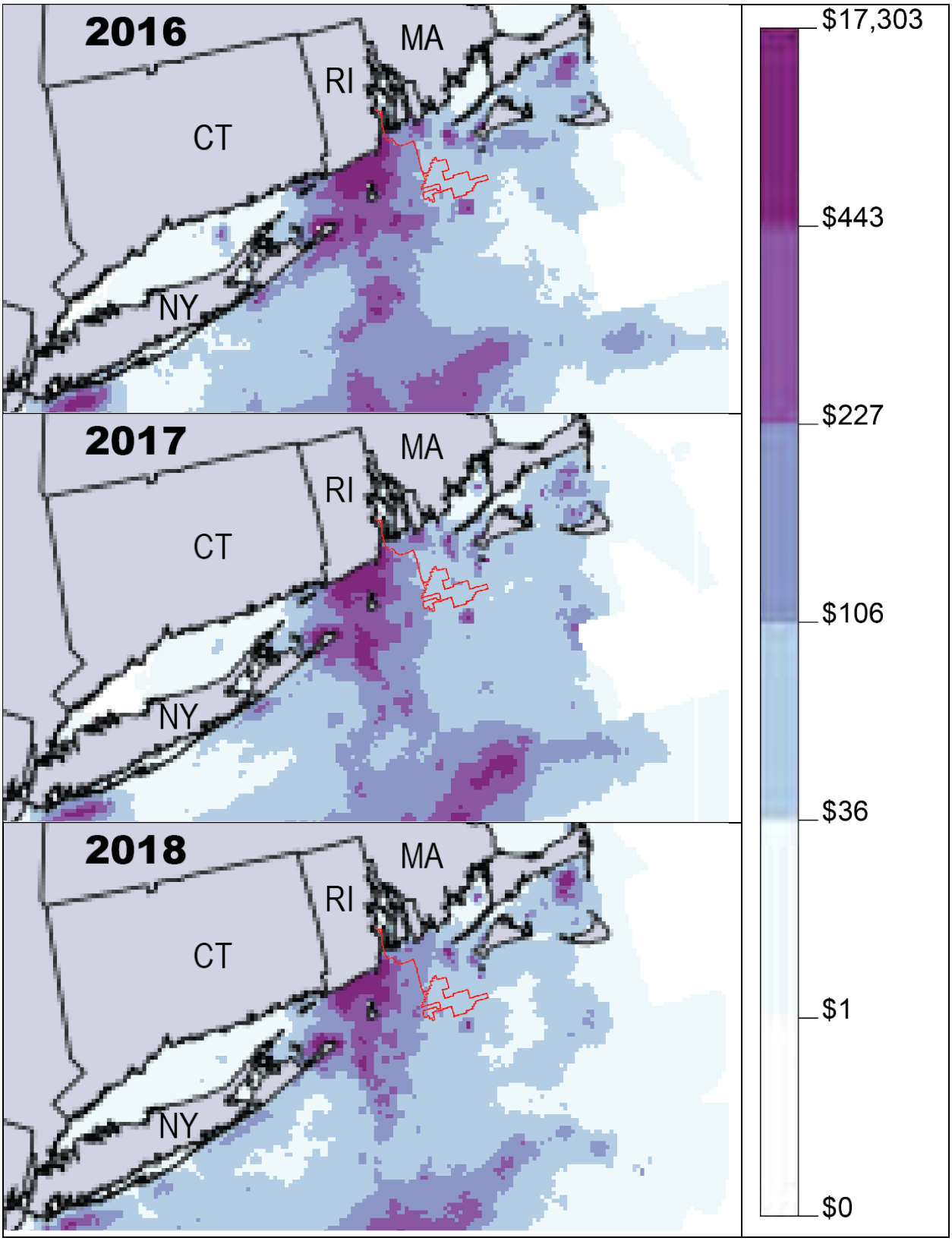

Figure G-12. Revenue Intensity for the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan in the Vicinity of the Lease Area, 2016–2018 (NMFS 2020b).

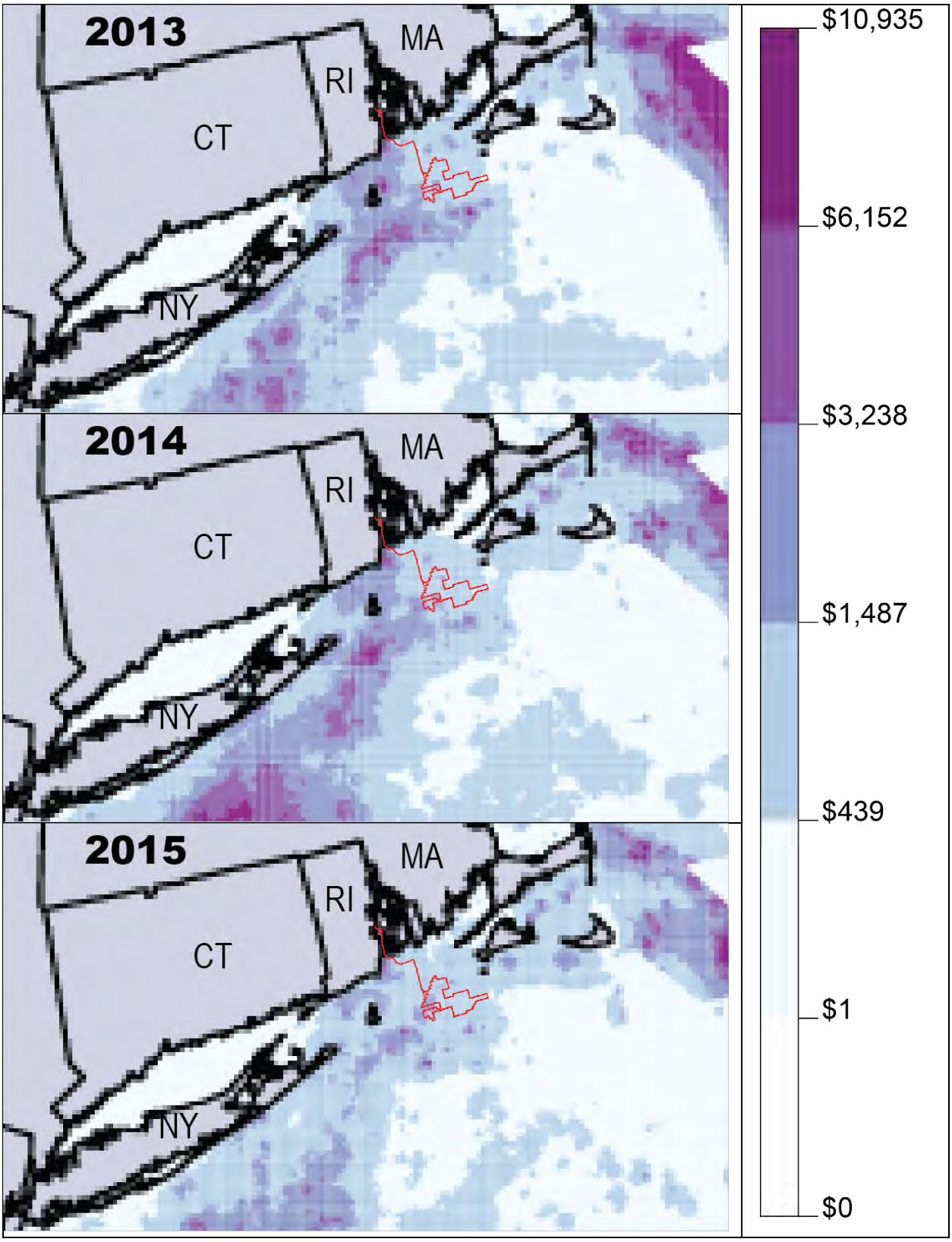

Figure G-13. Revenue Intensity for All Fisheries Combined in the Vicinity of the Lease Area, 2013–2015 (NMFS 2020b).

Analysis of the Economic Dependency on Fishing Grounds in the Lease Area among Commercial Fishing Vessels

To analyze differences in the economic importance of fishing grounds in the Lease Area across the commercial fishing fleet, information was obtained from NMFS (2021c) on the number of federally permitted commercial fishing vessels that fished annually in the Lease Area during the 2008–2019 period, together with box plot figure summarizing the relative dependence of these vessels during that period.

The vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from lowest to highest percentage value and then dividing the data into four groups of equal size. The first quartile represents the lowest 25% of ranked percentages while the fourth quartile represents the highest 25%. NMFS (2021c) reported the number of "outlier" vessels in the revenue distribution of percentage of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.[5]

As shown in Table G-2, from 2008 through 2019, an average of 289 vessels per year fished in the Lease Area, with a high of 331 vessels in 2008 and a low of 251 vessels in 2018. The average annual number of outliers was 40.5 (14% of all vessels), with a high of 47 outliers in 2016 (14.6% of all vessels) and a low of 31 outliers in 2019 (11.8% of all vessels).

Table G-2. Number of Federally Permitted Vessels in the Lease Area (2008–2019)

Year	Number of Vessels	Number of Outliers	Number of Outliers as a Percentage of Total Vessels
2008	331	46	13.9%
2009	308	43	14.0%
2010	253	35	13.8%
2011	262	31	11.8%
2012	282	40	14.2%
2013	308	41	13.3%
2014	308	46	14.9%
2015	296	40	13.5%
2016	322	47	14.6%
2017	284	40	14.1%

[5] Technically, an outlier in a box plot distribution is an observation that is more than 1.5 times the length of the box away from either the first quartile (Q1) or third quartile (Q3). Specifically, if an observation is less than Q1 – (1.5 × IQR) or greater than Q3 + (1.5 × IQR), it is an outlier; where IQR = interquartile range = Q3 – Q1.

Year	Number of Vessels	Number of Outliers	Number of Outliers as a Percentage of Total Vessels
2018	251	35	13.9%
2019	261	42	16.1%
Average	288	40	14.0%

Source: NMFS (2021c).

More detailed information about the distribution of the vessel-level annual revenue percentages is provided in the boxplot below (see Figure G-14). The box plot begins at the first quartile, or the value beneath which 25% of all vessel-level revenue percentages fall. A thick line within the box identifies the median, the observation at which 50% of vessel-level revenue percentages are above or beneath. The box ends at the third quartile, or the vessel-level revenue percentage beneath which 75% of observations fall. Nonparametric estimates of the minimum and maximum values are also indicated by the "whiskers" (dashed line terminating in a vertical line) that jut out from each side of the box. Any points outside of these whiskers are vessel-level revenue percentages that are considered outliers.

From 2008 through 2019, the vessel ranked as the seventy-fifth percentile vessel (i.e., the vessel in the third quartile with the greatest dependence on the Lease Area over the 12-year period) derived 0.88% of its total revenue from the Lease Area (NMFS 2021c). Of the outliers, the vessel with the greatest dependence on the Lease Area derived 38% of its total revenue from the area. Looking at individual years shown in the box plot, in 2008, one vessel derived nearly 60% of its total revenue from the Lease Area. In that same year, the vessel with the greatest percentage of dependence in the third quartile generated approximately 2.2% of its revenue from the Lease Area. Figure G-14 shows that in any given year the revenue percentage for the majority of outliers were below 10%.

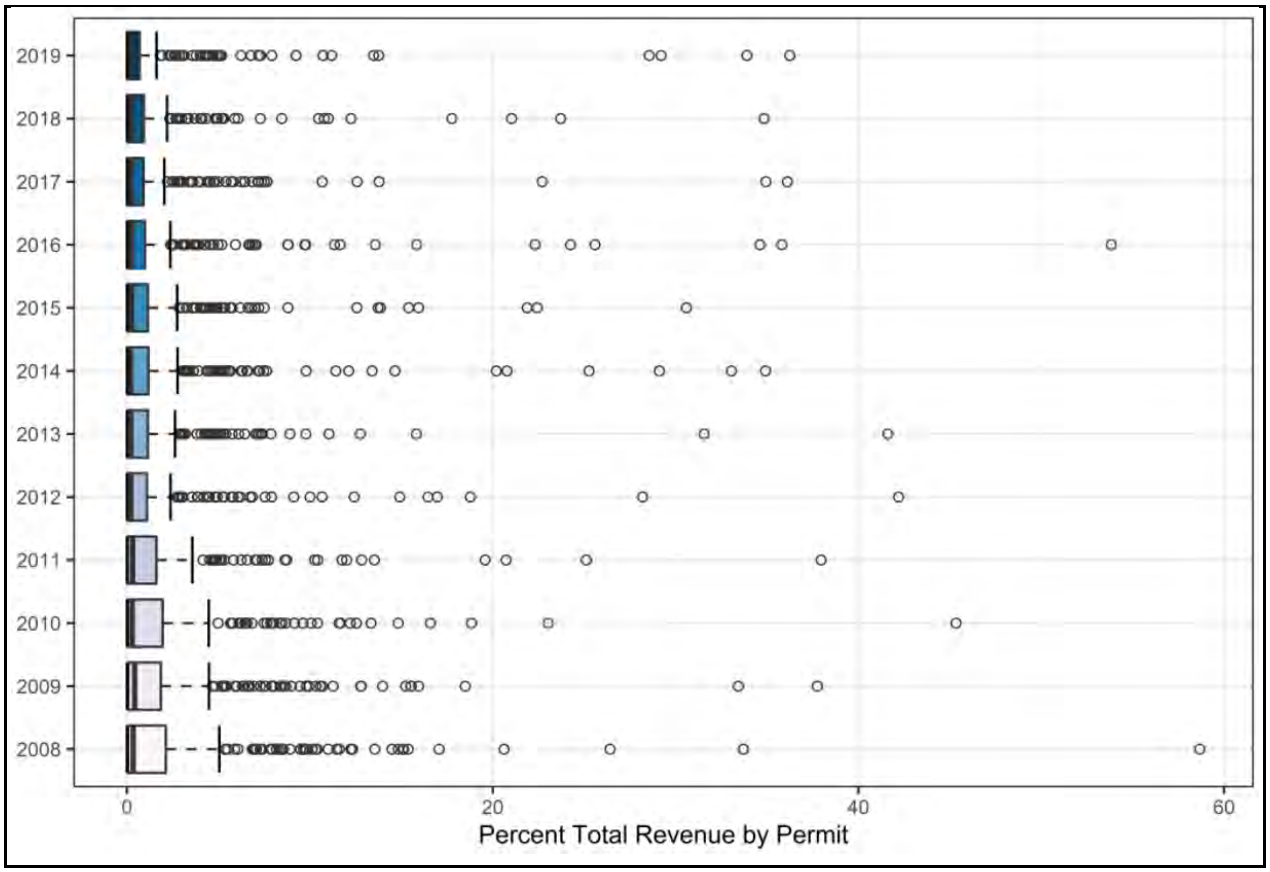

Figure G-14. Percentage of Total Commercial Fishing Revenue of Federally Permitted Vessels Derived from the Lease Area by Vessel (2008–2019) (NMFS 2021c).

It is important to note that the box plot data do not provide any information about total revenues, or if there are correlations between the relative dependence on the lease area and total revenue of the individual vessel. To that end, additional data will be requested from NMFS that will indicate for each quartile and for the outliers as a group the total revenue for the quartile/outlier group from within the Lease Area (i.e., the average numerator) as well as the total revenue from all areas (i.e., average denominator) for the quartile/outlier group.

Annual Commercial Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery, Port, and Gear under Alternatives C, D, and E

Alternative C

FMP Fishery

Table G-3. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative C1 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$462.9	$261.8	0.28%	3.36%
Atlantic Herring	$267.1	$100.9	0.39%	3.37%
Bluefish	$17.0	$8.6	0.67%	1.47%
Highly Migratory Species	$6.8	$2.2	0.10%	0.98%
Jonah Crab	$37.8	$21.4	0.22%	0.36%
Mackerel, Squid, and Butterfish	$296.6	$136.4	0.26%	0.88%
Monkfish	$179.0	$97.9	0.48%	1.30%
Northeast Multispecies (large-mesh)	$112.3	$48.9	0.07%	2.05%
Northeast Multispecies (small-mesh)	$189.0	$71.1	0.63%	2.52%
Sea Scallop	$367.9	$143.7	0.03%	0.29%
Skates	$160.5	$102.1	1.37%	2.85%
Spiny Dogfish	$35.2	$15.2	0.51%	6.22%
Summer Flounder, Scup, Black Sea Bass	$126.3	$80.5	0.20%	0.73%
Other FMPs, non-disclosed species and non-FMP fisheries	$550.4	$235.4	0.25%	0.70%
All FMP and non-FMP Fisheries	$1,610.9	$1,326.0	0.14%	0.92%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-4. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative C2 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$428.1	$246.0	0.26%	3.15%
Atlantic Herring	$261.1	$99.2	0.38%	3.31%
Bluefish	$16.8	$8.5	0.67%	1.46%
Highly Migratory Species	$6.6	$2.1	0.09%	0.95%
Jonah Crab	$36.0	$20.3	0.21%	0.35%
Mackerel, Squid, and Butterfish	$279.7	$130.7	0.25%	0.85%
Monkfish	$166.4	$92.6	0.45%	1.23%
Northeast Multispecies (large-mesh)	$109.3	$47.1	0.06%	1.97%
Northeast Multispecies (small-mesh)	$185.3	$69.2	0.61%	2.45%
Sea Scallop	$354.5	$138.1	0.03%	0.28%
Skates	$152.3	$97.0	1.30%	2.71%
Spiny Dogfish	$34.6	$14.7	0.49%	6.03%
Summer Flounder, Scup, Black Sea Bass	$121.9	$77.8	0.20%	0.71%
Other FMPs, non-disclosed species and non-FMP fisheries	$534.3	$227.5	0.24%	0.67%
All FMP and non-FMP Fisheries	$1,546.5	$1,270.8	0.13%	0.88%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Port

Table G-5. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative C1 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$712.4	$547.3	1.19%	1.99%
New Bedford, MA	$566.0	$340.1	0.09%	0.70%
Little Compton, RI	$192.5	$131.8	6.62%	6.79%
Westport, MA	$107.0	$58.2	4.46%	4.98%
Newport, RI	$188.0	$104.1	1.17%	3.61%
Chilmark/Menemsha, MA	$23.4	$14.3	3.04%	3.41%
Fairhaven, MA	*$27.1*	*$14.4*	*0.13%*	*1.00%*
Montauk, NY	$38.4	$17.0	0.09%	0.14%
Fall River, MA	*$17.6*	*$8.9*	*0.78%*	*2.00%*
Tiverton, RI	$15.0	$6.4	0.56%	0.98%
Other Ports, MA	*$16.3*	*$7.9*	*0.01%*	*0.16%*
Point Pleasant, NJ	*$15.6*	*$4.5*	*0.01%*	*0.05%*
Newport News, VA	*$15.3*	*$3.8*	*0.01%*	*0.22%*
Beaufort, NC	*$5.0*	*$2.4*	*0.09%*	*0.28%*
Hampton, VA	*$7.1*	*$3.5*	*0.02%*	*0.22%*
Other New England/Mid-Atlantic ports*	$145.7	$80.7	0.03%	0.27%
All New England/Mid-Atlantic Ports	$1,610.9	$1,345.2	0.14%	0.93%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-6. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative C2 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$691.4	$531.0	1.15%	1.93%
New Bedford, MA	$549.2	$325.4	0.09%	0.67%
Little Compton, RI	$186.3	$126.9	6.37%	6.54%
Westport, MA	$87.8	$49.5	3.79%	4.23%
Newport, RI	$184.1	$100.9	1.13%	3.50%
Chilmark/Menemsha, MA	$20.9	$12.6	2.67%	2.99%
Fairhaven, MA	*$25.6*	*$13.7*	*0.12%*	*0.95%*
Montauk, NY	$36.1	$16.1	0.09%	0.14%
Fall River, MA	*$17.1*	*$8.7*	*0.77%*	*1.95%*
Tiverton, RI	$14.3	$6.1	0.53%	0.94%
Other Ports, MA	*$16.1*	*$7.6*	*0.01%*	*0.16%*
Point Pleasant, NJ	*$14.0*	*$4.1*	*0.01%*	*0.05%*
Newport News, VA	*$14.6*	*$3.6*	*0.01%*	*0.21%*
Beaufort, NC	*$4.7*	*$2.2*	*0.08%*	*0.26%*
Hampton, VA	*$6.6*	*$3.2*	*0.02%*	*0.21%*
Other New England/Mid-Atlantic ports*	$142.2	$77.7	0.03%	0.26%
All New England/Mid-Atlantic Ports	$1,546.5	$1,289.3	0.14%	0.89%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Gear

Table G-7. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative C1 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$388.3	$114.0	0.19%	0.55%
Dredge-scallop	$370.1	$144.2	0.03%	0.30%
Gillnet-sink	$260.6	$178.9	0.60%	1.86%
Handline	$12.3	$3.2	0.07%	0.24%
Pot-other	$482.2	$319.1	0.28%	1.98%
Trawl-bottom	$621.2	$467.3	0.25%	1.09%
Trawl-midwater	$187.1	$96.0	0.51%	4.09%
All other gear*	$282.2	$66.7	0.14%	2.50%
All gear types	$1,611.0	$1,389.5	0.15%	0.96%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-8. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative C2 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$381.6	$111.3	0.18%	0.53%
Dredge-scallop	$356.6	$138.6	0.03%	0.29%
Gillnet-sink	$241.8	$170.2	0.57%	1.77%
Handline	$11.3	$3.1	0.07%	0.23%
Pot-other	$445.6	$299.4	0.26%	1.86%
Trawl-bottom	$596.7	$451.2	0.24%	1.05%
Trawl-midwater	$182.1	$94.3	0.50%	4.02%
All other gear*	$275.9	$64.8	0.14%	2.43%
All gear types	$1,546.5	$1,333.0	0.14%	0.92%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Alternative D

FMP Fishery

Table G-9. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$492.7	$274.2	0.29%	3.52%
Atlantic Herring	$270.5	$101.8	0.39%	3.40%
Bluefish	$17.0	$8.6	0.67%	1.47%
Highly Migratory Species	$6.6	$2.1	0.10%	0.97%
Jonah Crab	$38.4	$22.0	0.23%	0.37%
Mackerel, Squid, and Butterfish	$306.4	$139.7	0.27%	0.91%
Monkfish	$186.9	$98.4	0.48%	1.31%
Northeast Multispecies (large-mesh)	$113.1	$48.8	0.07%	2.04%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Northeast Multispecies (small-mesh)	$190.7	$71.6	0.64%	2.53%
Sea Scallop	$338.6	$136.5	0.03%	0.27%
Skates	$166.5	$104.5	1.40%	2.92%
Spiny Dogfish	$35.2	$15.3	0.51%	6.27%
Summer Flounder, Scup, Black Sea Bass	$127.4	$81.5	0.20%	0.74%
Other FMPs, non-disclosed species and non-FMP fisheries	$567.3	$238.2	0.25%	0.71%
All FMP and non-FMP Fisheries	$1,632.7	$1,343.1	0.14%	0.93%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-10. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D2 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$496.8	$272.5	0.29%	3.49%
Atlantic Herring	$271.7	$102.3	0.39%	3.42%
Bluefish	$17.2	$8.7	0.68%	1.49%
Highly Migratory Species	$6.9	$2.2	0.10%	0.99%
Jonah Crab	$39.6	$22.5	0.23%	0.38%
Mackerel, Squid, and Butterfish	$305.4	$140.2	0.27%	0.91%
Monkfish	$201.8	$104.1	0.51%	1.38%
Northeast Multispecies (large-mesh)	$115.9	$51.5	0.07%	2.16%
Northeast Multispecies (small-mesh)	$192.5	$73.5	0.65%	2.60%
Sea Scallop	$371.8	$147.5	0.03%	0.30%
Skates	$168.7	$106.1	1.42%	2.96%
Spiny Dogfish	$35.7	$15.5	0.52%	6.36%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Summer Flounder, Scup, Black Sea Bass	$130.8	$83.0	0.21%	0.75%
Other FMPs, non-disclosed species and non-FMP fisheries	$571.6	$242.6	0.26%	0.72%
All FMP and non-FMP Fisheries	$1,662.1	$1,372.2	0.14%	0.95%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-11. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D3 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$479.9	$268.5	0.29%	3.44%
Atlantic Herring	$260.1	$97.7	0.38%	3.26%
Bluefish	$16.3	$8.5	0.66%	1.45%
Highly Migratory Species	$6.8	$2.1	0.10%	0.97%
Jonah Crab	$37.8	$21.8	0.23%	0.37%
Mackerel, Squid, and Butterfish	$308.8	$138.1	0.27%	0.90%
Monkfish	$205.9	$107.1	0.52%	1.42%
Northeast Multispecies (large-mesh)	$112.5	$50.0	0.07%	2.09%
Northeast Multispecies (small-mesh)	$167.1	$66.5	0.59%	2.36%
Sea Scallop	$405.1	$152.1	0.03%	0.31%
Skates	$170.3	$106.4	1.43%	2.97%
Spiny Dogfish	$31.5	$14.3	0.48%	5.87%
Summer Flounder, Scup, Black Sea Bass	$127.6	$79.9	0.20%	0.73%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species and non-FMP fisheries	$530.9	$235.3	0.25%	0.70%
All FMP and non-FMP Fisheries	$1,631.0	$1,348.4	0.14%	0.94%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-12. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D2 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$481.8	$262.8	0.28%	3.37%
Atlantic Herring	$268.8	$101.2	0.39%	3.38%
Bluefish	$17.0	$8.6	0.67%	1.47%
Highly Migratory Species	$6.6	$2.1	0.10%	0.96%
Jonah Crab	$37.4	$21.3	0.22%	0.36%
Mackerel, Squid, and Butterfish	$287.3	$134.6	0.26%	0.87%
Monkfish	$178.6	$92.5	0.45%	1.23%
Northeast Multispecies (large-mesh)	$112.1	$47.8	0.07%	2.00%
Northeast Multispecies (small-mesh)	$189.9	$70.8	0.63%	2.51%
Sea Scallop	$294.9	$127.0	0.02%	0.26%
Skates	$159.3	$99.8	1.34%	2.79%
Spiny Dogfish	$35.1	$15.1	0.51%	6.19%
Summer Flounder, Scup, Black Sea Bass	$124.8	$80.3	0.20%	0.73%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species and non-FMP fisheries	$564.3	$232.8	0.25%	0.69%
All FMP and non-FMP Fisheries	$1,587.0	$1,296.5	0.14%	0.90%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-13. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D3 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$464.9	$258.8	0.28%	3.32%
Atlantic Herring	$257.1	$96.6	0.37%	3.23%
Bluefish	$16.2	$8.3	0.65%	1.43%
Highly Migratory Species	$6.4	$2.1	0.09%	0.93%
Jonah Crab	$35.5	$20.7	0.22%	0.35%
Mackerel, Squid, and Butterfish	$290.7	$132.5	0.26%	0.86%
Monkfish	$182.8	$95.5	0.46%	1.27%
Northeast Multispecies (large-mesh)	$108.7	$46.2	0.06%	1.94%
Northeast Multispecies (small-mesh)	$164.5	$63.8	0.57%	2.26%
Sea Scallop	$328.3	$131.5	0.03%	0.26%
Skates	$160.9	$100.1	1.34%	2.80%
Spiny Dogfish	$31.0	$13.9	0.47%	5.69%
Summer Flounder, Scup, Black Sea Bass	$121.6	$77.2	0.19%	0.70%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species and non-FMP fisheries	$523.6	$225.4	0.24%	0.67%
All FMP and non-FMP Fisheries	$1,556.0	$1,272.7	0.13%	0.88%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-14. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D2+D3 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$468.9	$257.1	0.28%	3.30%
Atlantic Herring	$258.3	$97.1	0.37%	3.24%
Bluefish	$16.3	$8.4	0.66%	1.44%
Highly Migratory Species	$6.7	$2.1	0.10%	0.96%
Jonah Crab	$36.8	$21.1	0.22%	0.36%
Mackerel, Squid, and Butterfish	$289.7	$133.0	0.26%	0.86%
Monkfish	$197.7	$101.2	0.49%	1.35%
Northeast Multispecies (large-mesh)	$111.4	$49.0	0.07%	2.05%
Northeast Multispecies (small-mesh)	$166.3	$65.8	0.58%	2.33%
Sea Scallop	$367.0	$142.5	0.03%	0.29%
Skates	$163.1	$101.8	1.37%	2.84%
Spiny Dogfish	$31.4	$14.1	0.47%	5.78%
Summer Flounder, Scup, Black Sea Bass	$124.9	$78.7	0.20%	0.72%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species and non-FMP fisheries	$528.0	$229.9	0.24%	0.68%
All FMP and non-FMP Fisheries	$1,585.3	$1,301.8	0.14%	0.90%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-15. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative D1+D2+D3 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$454.0	$247.4	0.27%	3.17%
Atlantic Herring	$255.4	$96.0	0.37%	3.21%
Bluefish	$16.1	$8.3	0.65%	1.42%
Highly Migratory Species	$6.4	$2.0	0.09%	0.93%
Jonah Crab	$34.5	$20.0	0.21%	0.34%
Mackerel, Squid, and Butterfish	$271.7	$127.4	0.25%	0.83%
Monkfish	$174.6	$89.7	0.44%	1.19%
Northeast Multispecies (large-mesh)	$107.6	$45.2	0.06%	1.89%
Northeast Multispecies (small-mesh)	$163.7	$63.1	0.56%	2.24%
Sea Scallop	$290.1	$121.9	0.02%	0.25%
Skates	$153.7	$95.5	1.28%	2.67%
Spiny Dogfish	$30.9	$13.7	0.46%	5.60%
Summer Flounder, Scup, Black Sea Bass	$118.9	$75.9	0.19%	0.69%

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other FMPs, non-disclosed species and non-FMP fisheries	$520.7	$220.0	0.23%	0.65%
All FMP and non-FMP Fisheries	$1,510.3	$1,226.1	0.13%	0.85%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Port

Table G-16. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$719.1	$552.4	1.20%	2.01%
New Bedford, MA	$579.7	$340.3	0.09%	0.70%
Little Compton, RI	$203.7	$135.0	6.78%	6.96%
Westport, MA	$115.5	$62.3	4.77%	5.33%
Newport, RI	$188.3	$105.1	1.18%	3.65%
Chilmark/Menemsha, MA	$26.4	$16.0	3.40%	3.82%
Fairhaven, MA	*$27.7*	*$14.6*	*0.13%*	*1.01%*
Montauk, NY	$39.6	$17.2	0.09%	0.15%
Fall River, MA	*$18.0*	*$9.0*	*0.79%*	*2.02%*
Tiverton, RI	$14.0	$6.2	0.54%	0.95%
Other Ports, MA	*$16.1*	*$7.7*	*0.01%*	*0.16%*
Point Pleasant, NJ	*$16.3*	*$4.6*	*0.01%*	*0.05%*
Newport News, VA	*$15.5*	*$3.9*	*0.01%*	*0.23%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Beaufort, NC	*$5.1*	*$2.5*	*0.09%*	*0.29%*
Hampton, VA	*$7.2*	*$3.6*	*0.02%*	*0.23%*
Other New England/Mid-Atlantic ports*	$111.9	$55.9	0.02%	0.19%
All New England/Mid-Atlantic Ports	$1,591.9	$1,336.5	0.14%	0.93%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-17. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D2 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$734.9	$567.4	1.23%	2.06%
New Bedford, MA	$574.6	$346.6	0.09%	0.71%
Little Compton, RI	$218.9	$142.0	7.13%	7.32%
Westport, MA	$117.3	$65.9	5.05%	5.63%
Newport, RI	$192.8	$107.5	1.21%	3.73%
Chilmark/Menemsha, MA	$26.1	$13.9	2.95%	3.31%
Fairhaven, MA	*$19.3*	*$8.9*	*0.08%*	*0.62%*
Montauk, NY	$39.9	$18.0	0.10%	0.15%
Fall River, MA	*$18.0*	*$9.1*	*0.80%*	*2.03%*
Tiverton, RI	*$17.0*	*$7.7*	*0.67%*	*1.18%*
Other Ports, MA	$12.5	ND	ND	ND
Point Pleasant, NJ	*$16.4*	*$4.7*	*0.02%*	*0.05%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Newport News, VA	*$15.6*	*$3.9*	*0.01%*	*0.23%*
Beaufort, NC	*$5.1*	*$2.5*	*0.09%*	*0.29%*
Hampton, VA	*$7.7*	*$3.7*	*0.03%*	*0.24%*
Other New England/Mid-Atlantic ports*	$112.3	$66.2	0.02%	0.22%
All New England/Mid-Atlantic Ports	$1,621.3	$1,367.9	0.14%	0.95%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-18. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D3 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$698.7	$539.0	1.17%	1.96%
New Bedford, MA	$553.3	$353.3	0.09%	0.73%
Little Compton, RI	$213.0	$136.6	6.86%	7.04%
Westport, MA	$116.2	$65.2	5.00%	5.58%
Newport, RI	$186.5	$105.0	1.18%	3.64%
Chilmark/Menemsha, MA	$28.6	$16.7	3.54%	3.97%
Fairhaven, MA	*$29.1*	*$15.2*	*0.13%*	*1.05%*
Montauk, NY	$40.8	$17.9	0.10%	0.15%
Fall River, MA	$17.6	ND	ND	ND
Tiverton, RI	*$17.4*	*$7.3*	*0.63%*	*1.11%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Other Ports, MA	*$15.9*	*$6.8*	*0.01%*	*0.14%*
Point Pleasant, NJ	*$16.0*	*$4.5*	*0.01%*	*0.05%*
Newport News, VA	*$14.7*	*$3.8*	*0.01%*	*0.22%*
Beaufort, NC	*$5.2*	*$2.5*	*0.10%*	*0.29%*
Hampton, VA	*$7.9*	*$3.8*	*0.03%*	*0.24%*
Other New England/Mid-Atlantic ports*	$107.0	$64.4	0.02%	0.22%
All New England/Mid-Atlantic Ports	$1,591.1	$1,341.8	0.14%	0.93%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-19. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D2 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$707.4	$545.6	1.18%	1.98%
New Bedford, MA	$558.1	$317.5	0.08%	0.65%
Little Compton, RI	$202.8	$133.7	6.71%	6.89%
Westport, MA	$111.8	$61.0	4.68%	5.22%
Newport, RI	$187.1	$103.7	1.17%	3.60%
Chilmark/Menemsha, MA	$23.3	$12.9	2.75%	3.08%
Fairhaven, MA	*$17.2*	*$8.1*	*0.07%*	*0.56%*
Montauk, NY	$36.7	$16.4	0.09%	0.14%
Fall River, MA	*$17.8*	*$8.9*	*0.78%*	*2.00%*
Tiverton, RI	*$13.6*	*$6.7*	*0.58%*	*1.02%*
Other Ports, MA	$12.1	ND	ND	ND

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Pleasant, NJ	*$15.9*	*$4.5*	*0.01%*	*0.05%*
Newport News, VA	*$14.9*	*$3.7*	*0.01%*	*0.22%*
Beaufort, NC	*$4.8*	*$2.3*	*0.09%*	*0.27%*
Hampton, VA	*$6.7*	*$3.3*	*0.02%*	*0.21%*
Other New England/Mid-Atlantic ports*	$107.4	$62.4	0.02%	0.21%
All New England/Mid-Atlantic Ports	$1,546.2	$1,290.9	0.14%	0.89%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-20. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D3 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$671.3	$517.2	1.12%	1.88%
New Bedford, MA	$536.9	$324.2	0.09%	0.67%
Little Compton, RI	$196.9	$128.4	6.45%	6.62%
Westport, MA	$110.7	$60.4	4.63%	5.17%
Newport, RI	$180.8	$101.2	1.14%	3.51%
Chilmark/Menemsha, MA	$25.8	$15.7	3.33%	3.74%
Fairhaven, MA	*$27.1*	*$14.3*	*0.13%*	*0.99%*
Montauk, NY	$37.6	$16.3	0.09%	0.14%
Fall River, MA	$17.3	ND	ND	ND
Tiverton, RI	*$13.6*	*$6.3*	*0.54%*	*0.96%*
Other Ports, MA	*$15.2*	*$6.3*	*0.01%*	*0.13%*
Point Pleasant, NJ	*$15.6*	*$4.3*	*0.01%*	*0.05%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Newport News, VA	*$14.0*	*$3.6*	*0.01%*	*0.21%*
Beaufort, NC	*$4.9*	*$2.4*	*0.09%*	*0.27%*
Hampton, VA	*$6.9*	*$3.4*	*0.02%*	*0.22%*
Other New England/Mid-Atlantic ports*	$102.0	$61.0	0.02%	0.20%
All New England/Mid-Atlantic Ports	$1,514.3	$1,264.9	0.13%	0.88%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-21. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D2+D3 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$687.1	$532.2	1.16%	1.93%
New Bedford, MA	$531.7	$330.5	0.09%	0.68%
Little Compton, RI	$212.0	$135.4	6.79%	6.98%
Westport, MA	$112.5	$63.9	4.90%	5.47%
Newport, RI	$185.3	$103.6	1.16%	3.60%
Chilmark/Menemsha, MA	$25.5	$13.6	2.88%	3.23%
Fairhaven, MA	*$18.7*	*$8.6*	*0.08%*	*0.60%*
Montauk, NY	$37.9	$17.0	0.09%	0.14%
Fall River, MA	$17.4	ND	ND	ND
Tiverton, RI	*$16.6*	*$7.0*	*0.61%*	*1.08%*
Other Ports, MA	$11.5	ND	ND	ND
Point Pleasant, NJ	*$15.6*	*$4.4*	*0.01%*	*0.05%*
Newport News, VA	*$14.1*	*$3.6*	*0.01%*	*0.21%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Beaufort, NC	*$4.9*	*$2.4*	*0.09%*	*0.28%*
Hampton, VA	*$7.5*	*$3.6*	*0.02%*	*0.23%*
Other New England/Mid-Atlantic ports*	$102.4	$69.2	0.02%	0.23%
All New England/Mid-Atlantic Ports	$1,543.6	$1,295.0	0.14%	0.90%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-22. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative D1+D2+D3 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$659.7	$510.4	1.11%	1.85%
New Bedford, MA	$515.3	$301.4	0.08%	0.62%
Little Compton, RI	$195.9	$127.1	6.38%	6.55%
Westport, MA	$107.0	$59.1	4.53%	5.06%
Newport, RI	$179.5	$99.7	1.12%	3.46%
Chilmark/Menemsha, MA	$22.7	$12.6	2.68%	3.00%
Fairhaven, MA	*$16.6*	*$7.8*	*0.07%*	*0.54%*
Montauk, NY	$34.7	$15.5	0.08%	0.13%
Fall River, MA	$17.1	ND	ND	ND
Tiverton, RI	*$12.9*	*$6.0*	*0.52%*	*0.92%*
Other Ports, MA	$10.8	ND	ND	ND
Point Pleasant, NJ	*$15.1*	*$4.2*	*0.01%*	*0.05%*
Newport News, VA	*$13.5*	*$3.4*	*0.01%*	*0.20%*
Beaufort, NC	*$4.6*	*$2.2*	*0.08%*	*0.26%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Hampton, VA	*$6.5*	*$3.2*	*0.02%*	*0.21%*
Other New England/Mid-Atlantic ports*	$97.4	$65.2	0.02%	0.22%
All New England/Mid-Atlantic Ports	$1,468.6	$1,218.0	0.13%	0.84%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. Vessels with 4 or fewer years of reported data are shown with an ND (non-disclosed) for average revenues and for percentages of other areas.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Gear

Table G-23. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$369.2	$94.1	0.15%	0.45%
Dredge-scallop	$339.9	$136.8	0.03%	0.28%
Gillnet-sink	$268.6	$180.1	0.60%	1.87%
Handline	$14.8	$3.4	0.07%	0.25%
Pot-other	$514.2	$333.0	0.29%	2.07%
Trawl-bottom	$631.3	$474.3	0.25%	1.10%
Trawl-midwater	$189.8	$97.1	0.51%	4.13%
All other gear*	$283.8	$79.6	0.17%	2.99%
All gear types	$1,632.7	$1,398.5	0.15%	0.97%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-24. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D2 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$371.2	$95.7	0.16%	0.46%
Dredge-scallop	$378.4	$148.0	0.03%	0.31%
Gillnet-sink	$271.9	$187.2	0.62%	1.95%
Handline	$15.5	$3.6	0.08%	0.27%
Pot-other	$518.8	$332.6	0.29%	2.07%
Trawl-bottom	$643.8	$482.6	0.26%	1.12%
Trawl-midwater	$190.6	$97.5	0.51%	4.15%
All other gear*	$287.8	$81.1	0.17%	3.04%
All gear types	$1,662.1	$1,428.3	0.15%	0.99%

Source: Developed using data from NMFS (2021b, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-25. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D3 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$335.5	$102.8	0.17%	0.49%
Dredge-scallop	$412.9	$152.7	0.03%	0.32%
Gillnet-sink	$282.2	$191.9	0.64%	2.00%
Handline	$15.6	$3.7	0.08%	0.27%
Pot-other	$502.1	$326.9	0.28%	2.03%
Trawl-bottom	$620.6	$463.4	0.25%	1.08%
Trawl-midwater	$182.1	$92.4	0.49%	3.93%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
All other gear*	$272.1	$88.4	0.19%	3.32%
All gear types	$1,631.0	$1,422.2	0.15%	0.98%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-26. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC during Project Construction by Gear Type under Alternative D1+D2 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$368.1	$92.8	0.15%	0.45%
Dredge-scallop	$299.9	$127.1	0.03%	0.26%
Gillnet-sink	$248.9	$169.9	0.57%	1.77%
Handline	$14.6	$3.4	0.07%	0.24%
Pot-other	$501.8	$320.3	0.28%	1.99%
Trawl-bottom	$616.3	$464.8	0.25%	1.08%
Trawl-midwater	$188.6	$96.5	0.51%	4.11%
All other gear*	$283.3	$76.5	0.16%	2.87%
All gear types	$1,587.0	$1,351.2	0.14%	0.94%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-27. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1+D3 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$332.4	$99.4	0.16%	0.48%
Dredge-scallop	$334.3	$131.9	0.03%	0.27%
Gillnet-sink	$259.2	$174.7	0.58%	1.82%
Handline	$14.8	$3.4	0.07%	0.25%
Pot-other	$485.1	$314.6	0.27%	1.96%
Trawl-bottom	$590.9	$445.6	0.24%	1.04%
Trawl-midwater	$180.1	$91.4	0.48%	3.89%
All other gear*	$267.6	$83.4	0.18%	3.13%
All gear types	$1,556.0	$1,344.3	0.14%	0.93%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-28. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D2+D3 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$334.4	$101.2	0.17%	0.49%
Dredge-scallop	$373.6	$143.0	0.03%	0.30%
Gillnet-sink	$263.5	$181.7	0.61%	1.89%
Handline	$15.4	$3.6	0.08%	0.26%
Pot-other	$489.7	$314.2	0.27%	1.95%
Trawl-bottom	$603.4	$453.9	0.24%	1.05%
Trawl-midwater	$180.9	$91.8	0.48%	3.91%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
All other gear*	$271.6	$85.1	0.18%	3.19%
All gear types	$1,585.3	$1,374.5	0.14%	0.95%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-29. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative D1+D2+D3 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$331.3	$97.8	0.16%	0.47%
Dredge-scallop	$295.1	$122.1	0.02%	0.25%
Gillnet-sink	$239.5	$164.5	0.55%	1.71%
Handline	$14.5	$3.3	0.07%	0.24%
Pot-other	$472.7	$301.9	0.26%	1.88%
Trawl-bottom	$575.9	$436.1	0.23%	1.01%
Trawl-midwater	$178.9	$90.8	0.48%	3.87%
All other gear*	$267.1	$80.1	0.17%	3.00%
All gear types	$1,510.3	$1,296.6	0.14%	0.90%

Source: Developed using data from NMFS (2021b, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Alternative E

FMP Fishery

Table G-30. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative E1 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$344.9	$189.3	0.20%	2.43%
Atlantic Herring	$206.4	$83.9	0.32%	2.80%
Bluefish	$15.8	$8.0	0.63%	1.37%
Highly Migratory Species	$5.9	$1.9	0.08%	0.86%
Jonah Crab	$26.2	$15.4	0.16%	0.26%
Mackerel, Squid, and Butterfish	$236.6	$111.8	0.22%	0.72%
Monkfish	$173.3	$89.0	0.43%	1.18%
Northeast Multispecies (large-mesh)	$100.6	$42.9	0.06%	1.80%
Northeast Multispecies (small-mesh)	$124.4	$55.2	0.49%	1.95%
Sea Scallop	$373.4	$134.1	0.03%	0.27%
Skates	$131.9	$82.9	1.11%	2.32%
Spiny Dogfish	$26.2	$11.5	0.39%	4.70%
Summer Flounder, Scup, Black Sea Bass	$103.2	$65.3	0.16%	0.59%
Other FMPs, non-disclosed species and non-FMP fisheries	$356.0	$169.3	0.18%	0.50%
All FMP and non-FMP Fisheries	$1,309.5	$1,060.5	0.11%	0.74%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Table G-31. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by FMP Fishery under Alternative E2 (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
American Lobster	$413.9	$225.9	0.24%	2.90%
Atlantic Herring	$218.6	$86.1	0.33%	2.87%
Bluefish	$15.1	$8.0	0.62%	1.36%
Highly Migratory Species	$6.4	$2.0	0.09%	0.90%
Jonah Crab	$29.9	$17.9	0.19%	0.31%
Mackerel, Squid, and Butterfish	$265.8	$120.7	0.23%	0.78%
Monkfish	$194.6	$99.7	0.48%	1.33%
Northeast Multispecies (large-mesh)	$103.1	$44.6	0.06%	1.87%
Northeast Multispecies (small-mesh)	$112.0	$51.2	0.45%	1.81%
Sea Scallop	$394.8	$142.9	0.03%	0.29%
Skates	$155.8	$94.9	1.27%	2.65%
Spiny Dogfish	$25.7	$11.9	0.40%	4.89%
Summer Flounder, Scup, Black Sea Bass	$113.7	$70.0	0.18%	0.64%
Other FMPs, non-disclosed species and non-FMP fisheries	$371.8	$191.5	0.20%	0.57%
All FMP and non-FMP Fisheries	$1,438.2	$1,167.3	0.12%	0.81%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Other FMPs, non-disclosed species, and non-FMP fisheries includes revenue from three FMP fisheries: Surfclam/ Ocean Quahog, Red Crab, and River Herring. In addition, it includes revenue from species in FMP fisheries for which data could not be disclosed due to confidentiality restrictions, and revenue earned by federally permitted vessels operating in fisheries that are not federally managed.

Port

Table G-32. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative E1 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$573.4	$445.1	0.97%	1.62%
New Bedford, MA	$372.5	$261.0	0.07%	0.54%
Little Compton, RI	$179.9	$107.4	5.39%	5.54%
Westport, MA	$70.1	$41.9	3.21%	3.58%
Newport, RI	$153.0	$88.5	1.00%	3.07%
Chilmark/Menemsha, MA	$19.7	$11.2	2.37%	2.66%
Fairhaven, MA	*$23.5*	*$12.2*	*0.11%*	*0.85%*
Montauk, NY	$32.4	$14.8	0.08%	0.12%
Fall River, MA	*$14.5*	*$6.9*	*0.60%*	*1.54%*
Tiverton, RI	$15.1	$5.5	0.48%	0.84%
Other Ports, MA	*$15.7*	*$7.1*	*0.01%*	*0.15%*
Point Pleasant, NJ	*$9.2*	*$2.8*	*0.01%*	*0.03%*
Newport News, VA	*$8.2*	*$2.3*	*0.01%*	*0.13%*
Beaufort, NC	*$4.0*	*$1.9*	*0.07%*	*0.22%*
Hampton, VA	*$6.3*	*$2.9*	*0.02%*	*0.19%*
Other New England/Mid-Atlantic ports*	$76.6	$38.1	0.01%	0.13%
All New England/Mid-Atlantic Ports	$1,309.5	$1,049.5	0.11%	0.73%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Table G-33. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Port under Alternative E2 (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue at Risk as a Percentage of Total Revenue in the Mid-Atlantic and New England Regions	Average Annual Revenue at Risk as a Percentage of Total Revenue in the RFA
Point Judith, RI	$589.0	$460.0	1.00%	1.67%
New Bedford, MA	$402.1	$299.6	0.08%	0.62%
Little Compton, RI	$197.6	$120.7	6.06%	6.22%
Westport, MA	$101.4	$58.8	4.51%	5.03%
Newport, RI	$166.7	$95.6	1.07%	3.32%
Chilmark/Menemsha, MA	$26.4	$15.5	3.29%	3.69%
Fairhaven, MA	*$26.7*	*$14.0*	*0.12%*	*0.97%*
Montauk, NY	$35.9	$16.0	0.09%	0.13%
Fall River, MA	*$15.7*	*$7.3*	*0.64%*	*1.64%*
Tiverton, RI	*$16.5*	*$6.1*	*0.53%*	*0.94%*
Other Ports, MA	*$15.8*	*$7.6*	*0.01%*	*0.16%*
Point Pleasant, NJ	*$13.4*	*$3.6*	*0.01%*	*0.04%*
Newport News, VA	*$11.1*	*$3.0*	*0.01%*	*0.18%*
Beaufort, NC	*$4.6*	*$2.3*	*0.09%*	*0.26%*
Hampton, VA	*$7.3*	*$3.4*	*0.02%*	*0.22%*
Other New England/Mid-Atlantic ports*	$122.2	$71.1	0.02%	0.24%
All New England/Mid-Atlantic Ports	$1,438.2	$1,184.5	0.12%	0.82%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Ports shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing along the offshore RWEC or in the Lease Area.

Gear

Table G-34. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative E1 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$189.3	$55.9	0.09%	0.27%
Dredge-scallop	$380.8	$134.8	0.03%	0.28%
Gillnet-sink	$236.5	$161.4	0.54%	1.68%
Handline	$13.7	$3.3	0.07%	0.24%
Pot-other	$357.8	$231.0	0.20%	1.44%
Trawl-bottom	$494.3	$380.3	0.20%	0.88%
Trawl-midwater	$152.4	$75.9	0.40%	3.23%
All other gear*	$184.1	$53.9	0.11%	2.02%
All gear types	$1,309.5	$1,096.4	0.11%	0.76%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

Table G-35. Annual Commercial Fishing Revenue Exposed in the Lease Area and along the RWEC by Gear Type under Alternative E2 (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Dredge-clam	$207.3	$78.1	0.13%	0.37%
Dredge-scallop	$402.5	$143.6	0.03%	0.30%
Gillnet-sink	$264.0	$178.9	0.60%	1.86%
Handline	$15.3	$3.6	0.08%	0.26%
Pot-other	$432.2	$276.3	0.24%	1.72%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the Mid-Atlantic and New England Regions	Average Annual Revenue in the Lease Area as a Percentage of Total Landings in the RFA
Trawl-bottom	$541.9	$398.6	0.21%	0.93%
Trawl-midwater	$156.2	$79.5	0.42%	3.39%
All other gear*	$230.2	$54.6	0.12%	2.05%
All gear types	$1,438.2	$1,213.1	0.13%	0.84%

Source: Developed using data from NMFS (2021a, 2022).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows including the total row.

Gear types shown in *italics* indicate that fewer than 12 years but more than 4 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear for years when they were not disclosed.

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Demographics, Employment, and Economics

This section provides a summary of the assumptions and methodologies used to generate estimates of the employment impacts of the RWF under the alternatives assessed.

Assumptions Regarding Local Hiring Practices and Local and U.S. Suppliers of Wind Farm Components

This section contains two subsections that describe a) the assumptions regarding the local hiring practices of Revolution Wind, and b) the ability of local and U.S. manufacturing industries to meet the demands of offshore wind projects.

Local Hiring Practices

Revolution Wind documents many of its assumptions relating to local hiring practices in Table ES-1 of the COP and provides additional information in Section 4.6.1 of the COP. These are summarized in the bulleted list below and provide guidance for the assessment of the economic impacts of the Project and alternatives:

- Where possible, local workers would be hired to meet labor needs for Project construction, operations and maintenance (O&M), and decommissioning.
- The onshore facilities construction schedule would be designed to minimize impacts to the local community during the summer tourist season, generally between Memorial Day and Labor Day.
- The RWF would be constructed using multiple ports for fabrication and pre-commissioning and could utilize locations in different states throughout the geographic analysis area.
- Revolution Wind would hire local workers to the extent practical for RWF, RWEC, and interconnection facility management, fabrication, and construction.
- Non-local construction personnel typically include mariners, export cable manufacturing personnel, and other specialists who may temporarily relocate during the construction and decommissioning.
- Population impacts to the communities in the geographic analysis area could result mainly from the short-term influx of construction personnel. The total population change is assumed to equal the total number of non-local construction workers plus any accompanying family members. Due to the short duration of construction activities,[6] however, it is unlikely that non-local workers would relocate families to the area.

Assumptions Regarding the Ability of "Local Suppliers" to Meet Project Demands for Specialized Project Components

Several recent studies describe the offshore wind industry in the United States as being in its early developmental stages, and that as it currently exists, a relatively large share of the capital expenditures

[6] Revolution Wind lists the expected duration of various components of construction, installation, and commissioning of the Project in Sections 3.3 and 3.4 of the COP. It is assumed that the actual construction work on the Project would be completed within a 2-year window. Final engineering, design, and manufacturing of Project components would begin prior to actual construction and installation.

(CapEx) of the Project and the resulting jobs and income for offshore wind projects are likely to leak out to economies outside both the geographic analysis area and the United States as a whole. In its study for the U.S. Department of Energy, Navigant Consulting, Inc. (2013:x) states that because of the lack of U.S. demand for offshore components, "no domestic manufacturing facilities are currently serving the offshore wind market." More recently, AECOM (2017:3-42) in its white paper, *Evaluating Benefits of Offshore Wind Energy Projects in NEPA*, developed for BOEM, states the following:

> At each phase of offshore wind energy development, there is the potential to generate economic benefits locally, regionally, nationally, and/or internationally, depending on the extent to which these geographic areas can deliver the materials and skills necessary to develop offshore wind energy. Imported materials and services into the particular region being assessed represent lost opportunities for local production and employment. As the offshore wind energy industry advances in the U.S., more opportunities for domestic value can be created along the value chain and for supporting services. Supporting services could include consulting services, financial services, education and training, and research and development.

From a more quantitative perspective, BVG Associates Limited (BVG) (2017) concludes that for offshore projects constructed before 2022, the United States as a whole can expect to realize a minimum of 35% of the total expected jobs needed to meet U.S. demand, including jobs in the supply chain, development, and construction. In addition, BVG concludes that there is high probability that United States–based jobs could be between 50% and 63% of offshore wind–related jobs by 2022.

A March 2020 report by the American Wind Energy Association (2020) appears somewhat more conservative and assumes in its baseline scenario that by 2025, U.S. offshore wind installations will reach 2,000 MW per year with domestic content reaching 21% of the total capital expenditure. By 2030 it expects domestic content to increase to 45% in its baseline scenario.

Based on the economic impact methodology used, which is described in the next section, it is estimated that the local share of CapEx for the RWF will range from approximately 20% to 30% of pre-tax CapEx, while the local share for operating expenditures (OpEx) (excluding local taxes, lease payments, and finance charges) is estimated at 40% to 50% of total OpEx (excluding local taxes, lease payments, and finance charges).

Methodology Used to Estimate Employment and Value-Added Impacts of Alternatives Included in the Environmental Impact Statement

This section describes the methodology used to generate estimates of the economic impacts (jobs and value added) of the Project and included alternatives. The first section describes the estimates of economic impacts of the Project as estimated in the COP, and the second section describes the methodology utilized to assess the impacts of permutations of the Project required for the EIS that were not included in the COP.

Economics Impacts of the Project as Estimated in the Construction and Operations Plan

In the COP and Appendix BB to the COP, Guidehouse, Inc. (Guidehouse) (2020), using the Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) developed by the National

Renewable Energy Laboratory (NREL 2017), provides an economic impact analysis summarizing estimates of jobs, earnings, output, and value added that are expected to result from a "baseline" project with a nameplate capacity of 712 megawatts (MW) that utilizes 89 wind turbine generators (WTGs), each with a capacity to generate 8 MW of power. In COP Appendix BB, Guidehouse states that the "primary source for the model inputs was DWW Rev I who provided capital and operating budgets including costs, employment, and percent local data that are specific to the Project." While the COP and Appendix BB summarize "baseline project" impacts, very few of the project-specific inputs provided to Guidehouse for use in its modeling exercise were actually specified. Two key confidential inputs[7] were included in Appendix BB—specifically, the total expected capital expenditures (Total CapEx) for the Project and the total local expenditure for O&M (Local OpEx). Table G-36 summarizes the "local" jobs and investment impacts of the baseline project in Rhode Island and Connecticut as estimated by Guidehouse.

Table G-36. Summary of Jobs and Investment Impacts in Rhode Island and Connecticut for the Baseline Project

Project Phase	Impact Category	Jobs	Earnings ($ millions)	Output ($ millions)	Value Added ($ millions)
Construction	Direct	1,440	$124.40	$148.80	$130.10
	Indirect	1,623	$123.00	$497.40	$205.80
	Induced	793	$51.10	$137.60	$81.10
	Total	**3,856**	**$298.50**	**$783.90**	**$417.00**
Operations	Direct	58	$4.90	$4.90	$4.90
	Indirect	18	$1.50	$51.40	$47.50
	Induced	156	$10.80	$29.30	$17.60
	Total	**233**	**$17.20**	**$85.70**	**$70.00**

Source: Guidehouse (2021)

Note that the impacts of the baseline project (712-MW capacity utilizing eighty-nine 8-MW WTGs) during construction summarize impacts over the entire construction period. Construction job figures are in job years, which are full-time equivalent (FTE) jobs multiplied by the number of construction years. Operations jobs are FTEs for a period of 1 year.

Northern Economics—the contracted economic analysts for this EIS—have developed similar estimates using the same JEDI-OWM for an identically sized project using confidential inputs for Total CapEx and Total Local OpEx that were documented in Appendix BB, but without the additional inputs that were supplied to Guidehouse from Revolution Wind. These results are provided in Table G-37 while Table G-38 presents a percentage-based comparison of the two set of results. An examination of the tables indicates that there are differences in the two sets of tables—the additional inputs supplied by Revolution Wind to Guidehouse are important for directly estimating Project impacts.

[7] These key inputs are considered confidential and therefore cannot be specified in the EIS.

Table G-37. Summary of Jobs and Investment Impacts in Rhode Island and Connecticut for the Baseline Project as Developed by Northern Economics

Project Phase	Impact Category	Jobs	Earnings ($ millions)	Output ($ millions)	Value Added ($ millions)
Construction	Direct	1,185	$56.52	$222.28	$84.95
	Indirect	2,016	$146.37	$574.85	$224.00
	Induced	1,376	$86.84	$237.76	$145.13
	Total	**4,577**	**$289.73**	**$1,034.89**	**$454.09**
Operations	Direct	42	$4.32	$4.32	$4.32
	Indirect	222	$17.06	$59.12	$25.50
	Induced	81	$5.43	$15.30	$8.25
	Total	**345**	**$26.81**	**$78.73**	**$38.07**

Source: Developed by Northern Economics using information in COP Appendix BB.

Note that the impacts of the baseline project (712-MW capacity utilizing eighty-nine 8-MW WTGs) during construction summarize impacts over the entire construction period. Construction job figures are in job years, which are full-time equivalent (FTE) jobs multiplied by the number of construction years. Operations jobs are FTEs for a period of 1 year.

Table G-38. Percentage-Based Comparison of Jobs and Economic Development Impacts Offshore Wind Model Results

Project Phase	Impact Category	Jobs in Table G-37 as a Percentage of Jobs in Table G-36 (%)	Earnings in Table G-37 as a Percentage of Earnings in Table G-36 (%)	Output in Table G-37 as a Percentage of Output in Table G-36 (%)	Value Added in Table G-37 as a Percentage of Value Added in Table G-36 (%)
Construction	Direct	82%	45%	149%	65%
	Indirect	124%	119%	116%	109%
	Induced	174%	170%	173%	179%
	Total	**119%**	**97%**	**132%**	**109%**
Operations	Direct	71%	88%	88%	88%
	Indirect	1211%	1137%	115%	54%
	Induced	52%	50%	52%	47%
	Total	**148%**	**156%**	**92%**	**54%**

Source: Developed by Northern Economics.

Notwithstanding differences in the two sets of results, the full analysis of the economic impacts of the RWF requires estimates for the baseline project as well as estimates of economic impacts for the project if larger WTGs are used (i.e., 10-MW or 12-MW WTGs), and/or if the project capacity increased to its maximum capacity of 880 MW. In addition, because there is a suite of alternatives that could constrain the number of WTG positions that can be utilized (i.e., Alternatives C, D, and E) it will be necessary to

estimate economic impacts under a much wider range of Project configurations than the single configuration provided in the COP.

Therefore, a methodology that builds on the results developed by Guidehouse but allows the flexibility to estimate impacts under different configurations is required. This methodology is summarized below.

Methodology to Estimate Project Permutations while Incorporating Information from Guidehouse

The methodology developed to estimate project permutations relies on the fact that the JEDI-OWM is essentially a scalable model—if the number of WTGs increases relative to baseline and all other project inputs are held constant, then the economic impacts generally change proportionally regardless of the starting values.

Assume for example that rather than the baseline project of 712 MW utilizing eighty-nine 8-MW WTGs, a larger project of 800 MW utilizing one-hundred 8-MW turbines is assessed. In this case, the only change is the number of WTGs used in the project, which increase by 12.4% from 89 to 100. The WTGs used are assumed to have the same unit cost as the monopile foundations on which they are installed. Similarly, assuming the spacing of the WTGs remains constant, the total length of the inter-array cable would also be expected to increase by amount that approaches 12.4%. Table G-39 shows the percentage differences between the 800-MW project and the 712 MW project as estimated by Northern Economics. Based on the built-in scalability of the JEDI-OWM model, it assumed that if Guidehouse were to run the same comparison, changing only the total project capacity by changing the number of WTGs and holding all other factors constant, the results would be remarkably similar as those shown below.

Table G-39. Percentage-Based Comparison of Northern Economics JEDI-OWM Model Results between an 800-MW Project and a 712-MW Project

Project Phase	Impact Category	Jobs with the 800-MW Project as a Percentage of Jobs in Table G-3 (%)	Earnings with the 800-MW Project as a Percentage of Earnings in Table G-3 (%)	Output with the 800-MW Project as a Percentage of Output in Table G-3 (%)	Value Added with the 800-MW Project as a Percentage of Value Added in Table G-3 (%)
Construction	Direct	110.8%	109.0%	106.6%	108.4%
	Indirect	109.8%	110.3%	110.9%	110.3%
	Induced	111.0%	111.2%	111.1%	111.1%
	Total	**110.4%**	**110.3%**	**110.0%**	**110.2%**
Operations	Direct	112.4%	112.4%	112.4%	112.4%
	Indirect	112.4%	112.4%	112.4%	112.4%
	Induced	112.4%	112.4%	112.4%	112.4%
	Total	**112.4%**	**112.4%**	**112.4%**	**112.4%**

Based on the results above, economic impacts of project permutations will be estimated using the following steps:

1. Estimate the economic impacts of the project permutation by making appropriate changes to Northern Economics' baseline project inputs
2. Estimate the percentage change of the permutation against the Northern Economic baseline project impacts.
3. Apply this percentage change to the baseline project impacts estimated by Guidehouse.

Other Assumptions Used to Estimate Impacts of Project Permutations

In addition to the scaling methodology described above, the following assumptions are also utilized in the estimates of economic impacts.

Assumptions Regarding the Minimum Project Size If Larger Capacity Wind Turbine Generators are Utilized

Guidehouse does not explicitly state why it assumed a 712-MW project as opposed to a 704-MW project, which would match the Project's existing power purchase agreement (PPA) and the minimum project listed in the project design envelope (PDE), as reported in Appendix D. Note that a 712-MW project with eighty-nine 8-MW WTGs exceeds the PPA by one full 8-MW WTG. Therefore, it is assumed that excess capacity will be built by an amount equal to one WTG in excess of the number of WTGs nominally needed to meet the 704-MW PPA. Thus, if 10-MW WTGs are used, 71 WTGs (with a total capacity of 710 MW) would nominally be able meet the 704 PPA. It is assumed however that one additional WTG would be installed for a total of 720 MW—the extra WTG will provide greater reliability for customers of the project. Similarly, if 12-MW WTGs are utilized, 63 WTGs would nominally meet the PPA capacity with 708 MW. Adding one additional WTG (64 in total) will result in a project capacity of 720 MW and provide greater reliability.[8]

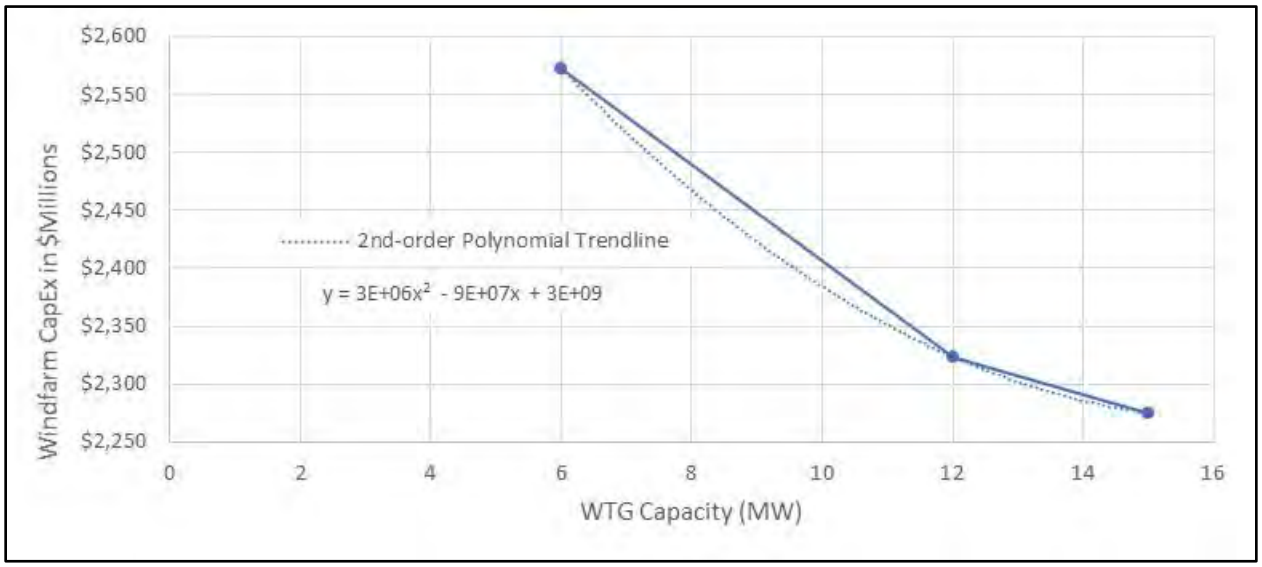
Assumptions Regarding the Relative Project Capital Costs when Higher Capacity Wind Turbine Generators Are Utilized

Information regarding the comparative capital costs of offshore wind projects that utilize smaller or larger WTGs are not readily available, although it is generally assumed and reported that utilization of larger WTGs generally results in lower overall capital costs and greater overall project efficiency. An updated version of the JEDI-OWM (Release 2021-2) has been made available (NREL 2021), which enables users to estimate project capital cost using a choice of three WTG capacities: 6 MW, 12 MW, or 15 MW.[9] Figure G-15 shows hypothetical capital cost of a 720-MW project with three alternative assumptions regarding the size of the WTGs. Moving from utilization of 6-MW WTGs to utilization of 12-MW WTGs results in a nominal CapEx reduction of approximately $250 million or 10% of total CapEx. Using 15-MW WTGs rather than 12-MW results in a smaller (2%) CapEx reduction. The 2nd order polynomial

[8] The Project developer has confirmed that the assumption is reasonable.

[9] While JEDI-OWM Release 2021-2 includes this built-in capital cost comparison feature, the model does not yet appear to include built-in local economic impact coefficients linked to multipliers that enable the user to generate economic impacts in terms of jobs, earnings, and value added.

trendline shown in the figure was used to estimates of CapEx savings for similar size projects using different sizes of WTGs ranging from 6 MW to 16 MW.



Source: Developed by Northern Economics using JEDI-OWM Release 2021-2 (NREL 2021) and the RWF Project location.
Note: Reviewers should not assume the project capital costs shown here reflect actual estimates of the project capital costs for Revolution Wind.

Figure G-15. Hypothetical Capital Cost Estimates of a 720 MW Wind Farm with Three WTG Sizes

Assumptions Regarding the Maximum Capacity Limits

The PDE summarized in Appendix D states that the maximum capacity of the Project is 880 MW. The PDE also indicates that WTGs ranging from 8 MW to 12 MW will be considered, but no more than 100 WTGs would be utilized. If one hundred 8-MW WTGs are utilized, then the largest project that could be built is 800 MW. An 880-MW project could be built using eighty-eight 10-MW WTGs, but if 12-MW WTGs are used, then seventy-three WTGs achieves a project capacity of 876 MW; utilizing seventy-four 12-MW WTGs results in a project that exceeds the maximum project capacity by 8 MW (i.e., project capacity would be 888 MW, and thus would not be developed).

Based on guidance from Revolution Wind (Roll 2021) indicating that they would not exceed the 880 MW maximum capacity of the project established in the PDE, it is presumed that the maximum project size that would be developed if 12-MW WTGs are used would comprise 73-WTGs with a total capacity of 876 MW. Similarly, if 14-MW WTGs are authorized as in Alternative F, the largest project that would be developed would utilize 62 14-MW WTGs for a total capacity of 868 MW, noting that adding an additional 14-MW turbine results in 882 MW of total capacity project which would exceed the 880 MW maximum capacity limit in the PDE.

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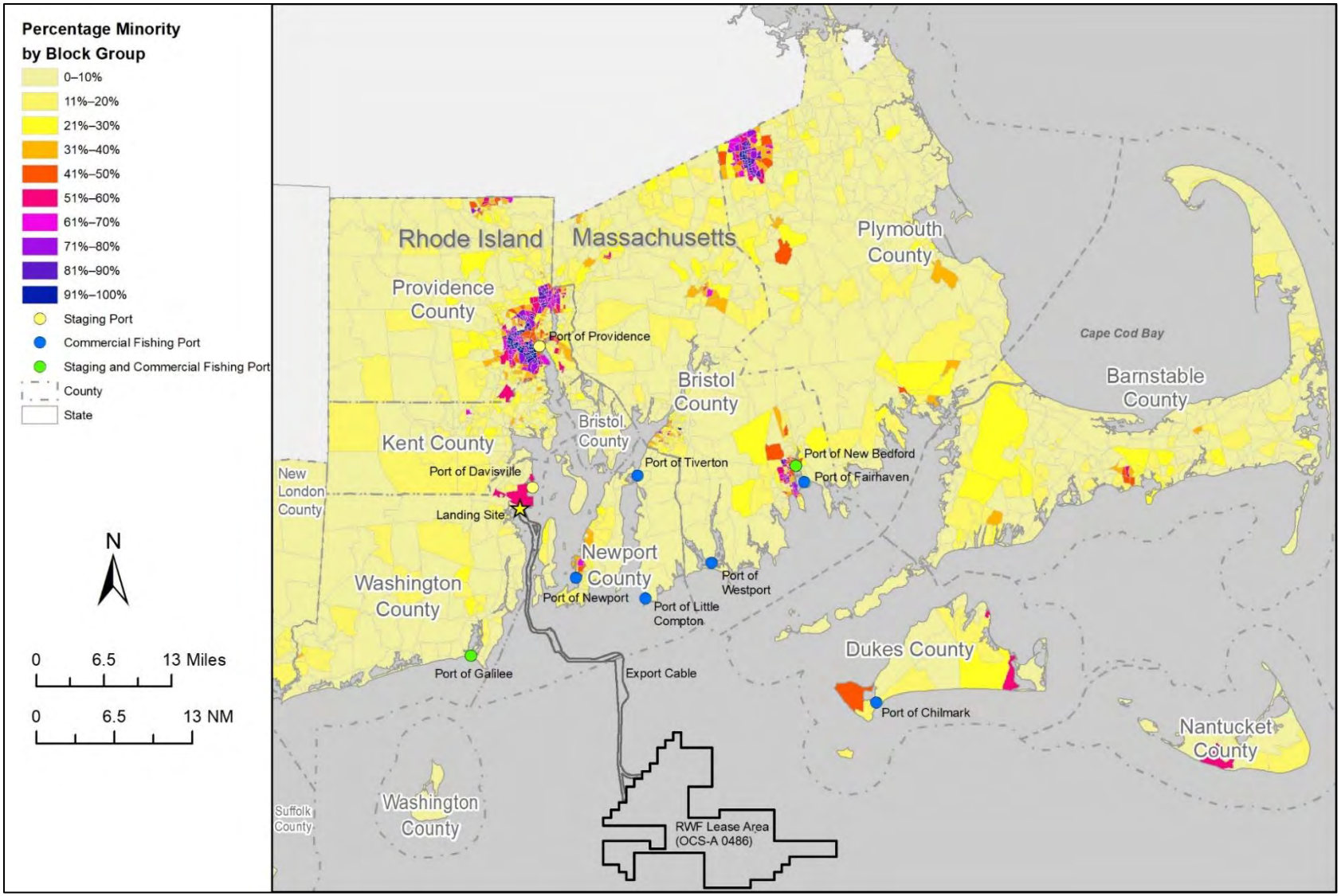
Environmental Justice

This section provides maps displaying the environmental justice characteristics of the counties and cities/towns in the geographical analysis area. The geographical analysis area includes counties that contain or are adjacent to ports that may be used for Project construction staging, O&M, or decommissioning; contain major ports that commercial fisheries that could be affected by the Project; that contain the proposed Project landing site and onshore transmission cable; or for which some portion of the county lies within the visual study area. Minority and low-income percentages are based on 2015-2019 American Community Survey 5-year summary file data obtained from EPA's EJScreen, an environmental justice screening and mapping tool (EPA 2021).

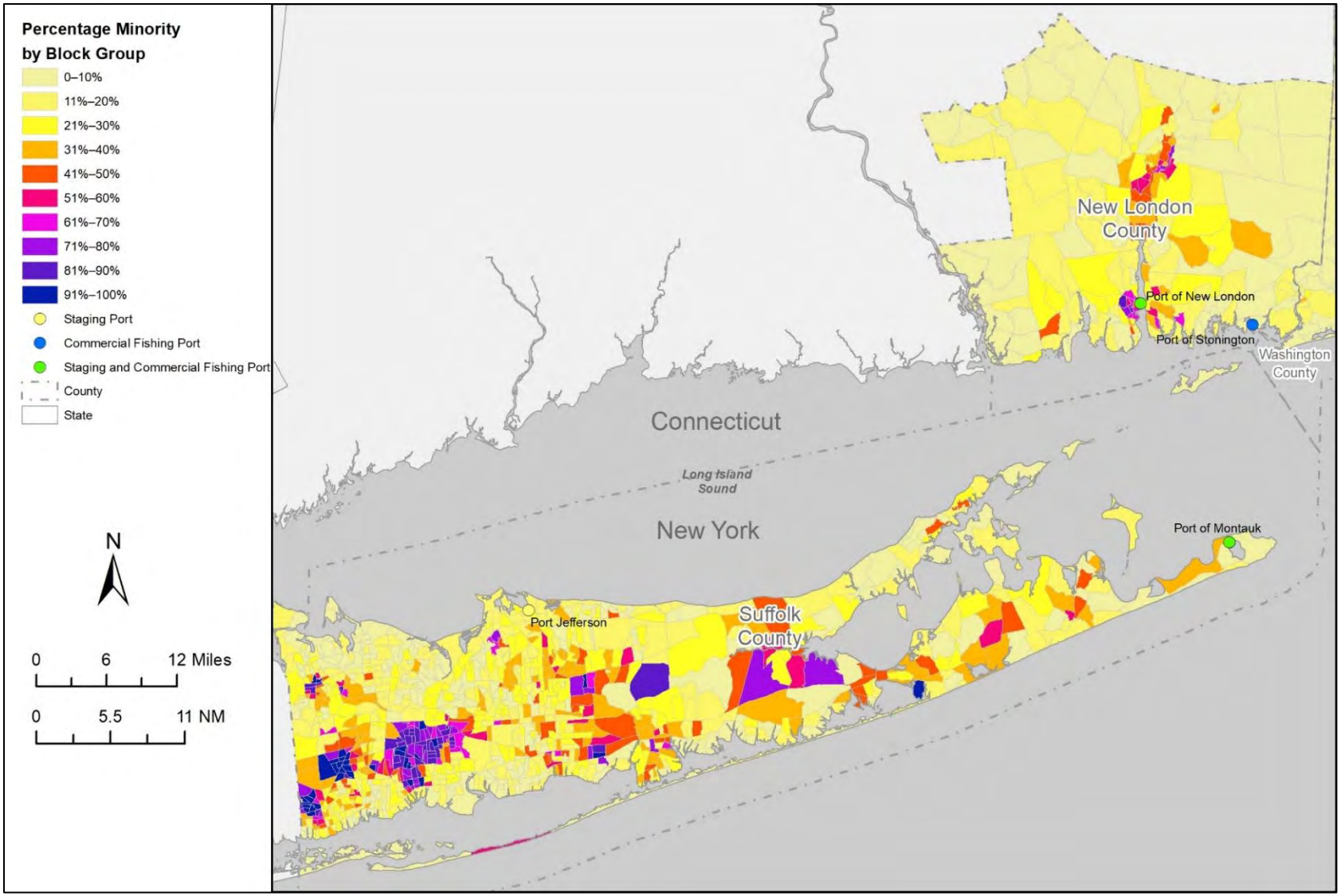
Figures G-16 though G-21 show minority population percentages by census block group, while Figures G-22 through G-27 show low-income population percentages by census block group. Figures G-28 though G-33 show the locations of block groups that have been determined to be potential environmental justice areas of concern because of concentrations of minority or low-income populations (see Section 3.12.1 for additional details).

Tables G-EJ1 through G-EJ26 provide additional information about the identity of the block groups determined to be potential environmental justice areas of concern. The tables list the multi-digit identifier of each of these block groups. The block group identifiers are organized by county and sub-county name (city, town, or census designated place). Each identifier listed in the tables include the census tract (CT) code and census block group (BG) code as reported by the U.S. Census Bureau in the online mapping tool available at https://tigerweb.geo.census.gov/tigerweb/ (U.S. Census Bureau 2021). The fully specified identifiers for census block groups include the two-digit code for the state and three-digit code for the county. The captions for the tables include these codes. Each block group is categorized based on whether it is a potential environmental justice concern because of its minority population, low-income population, or both.



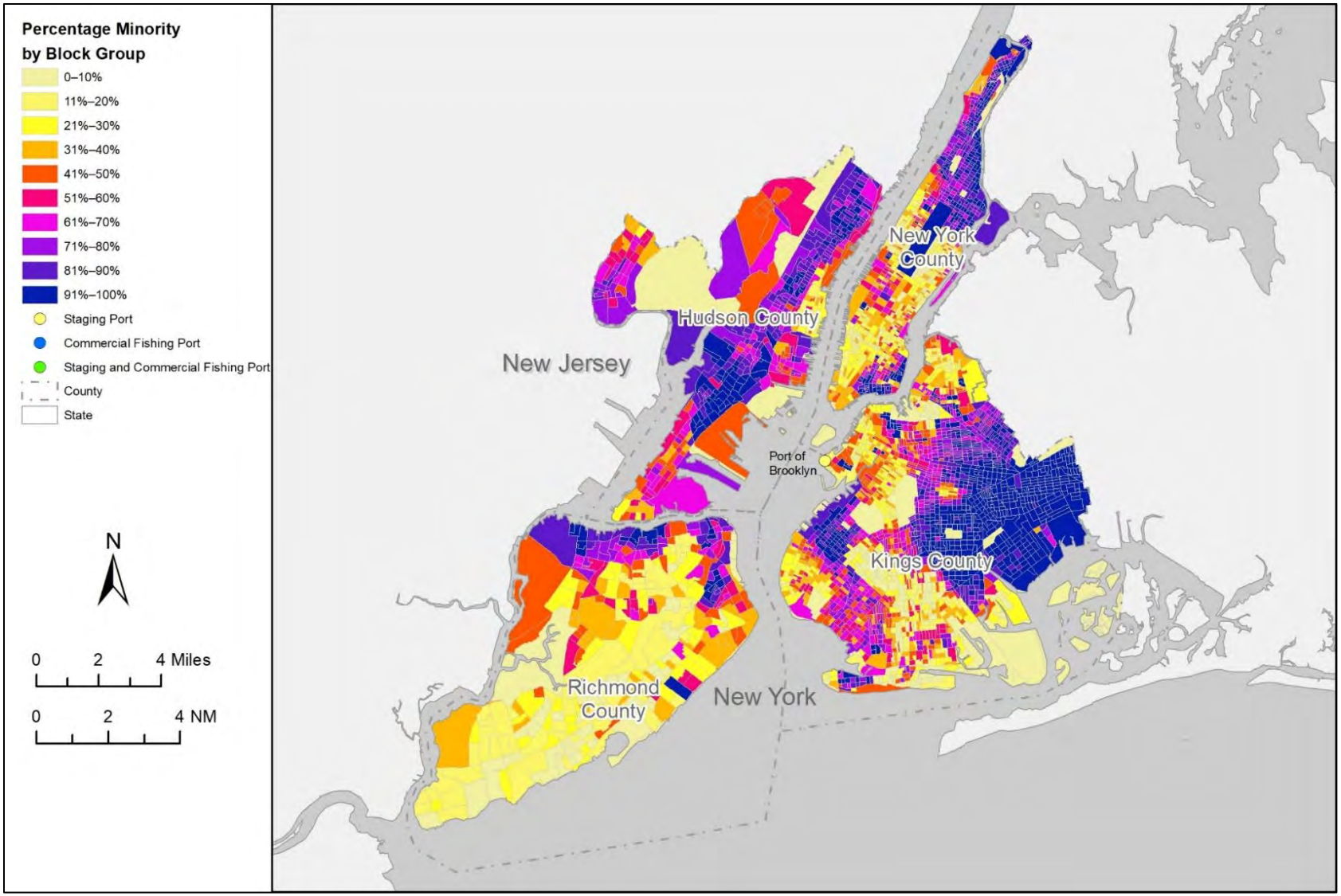
Source: Developed from information in EPA (2021).

Figure G-16. Distribution of minority populations by census block group in potentially affected counties in Rhode Island and Massachusetts.



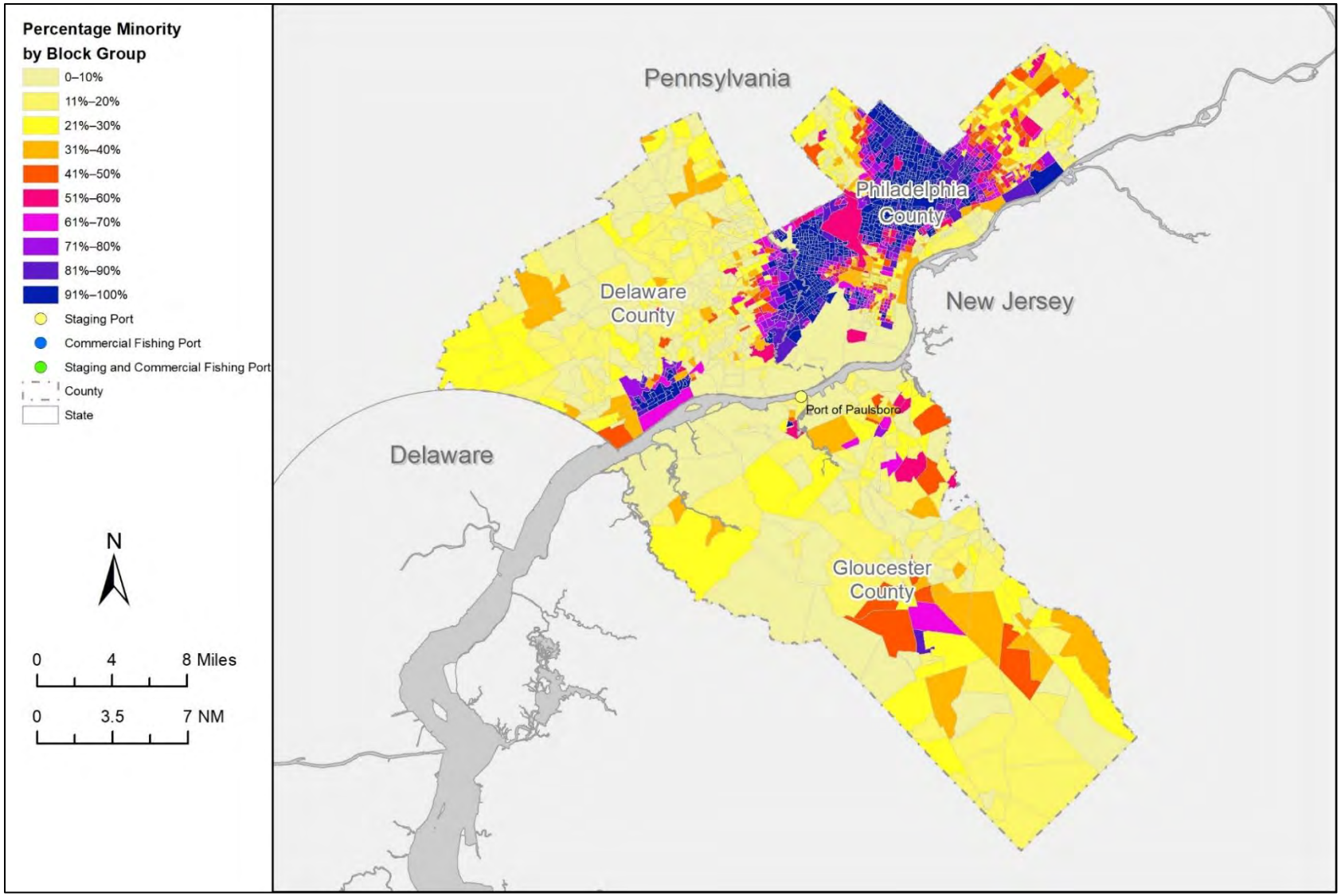
Source: Developed from information in EPA (2021).

Figure G-17. Distribution of minority populations by census block group in New London County, Connecticut, and Suffolk County, New York.



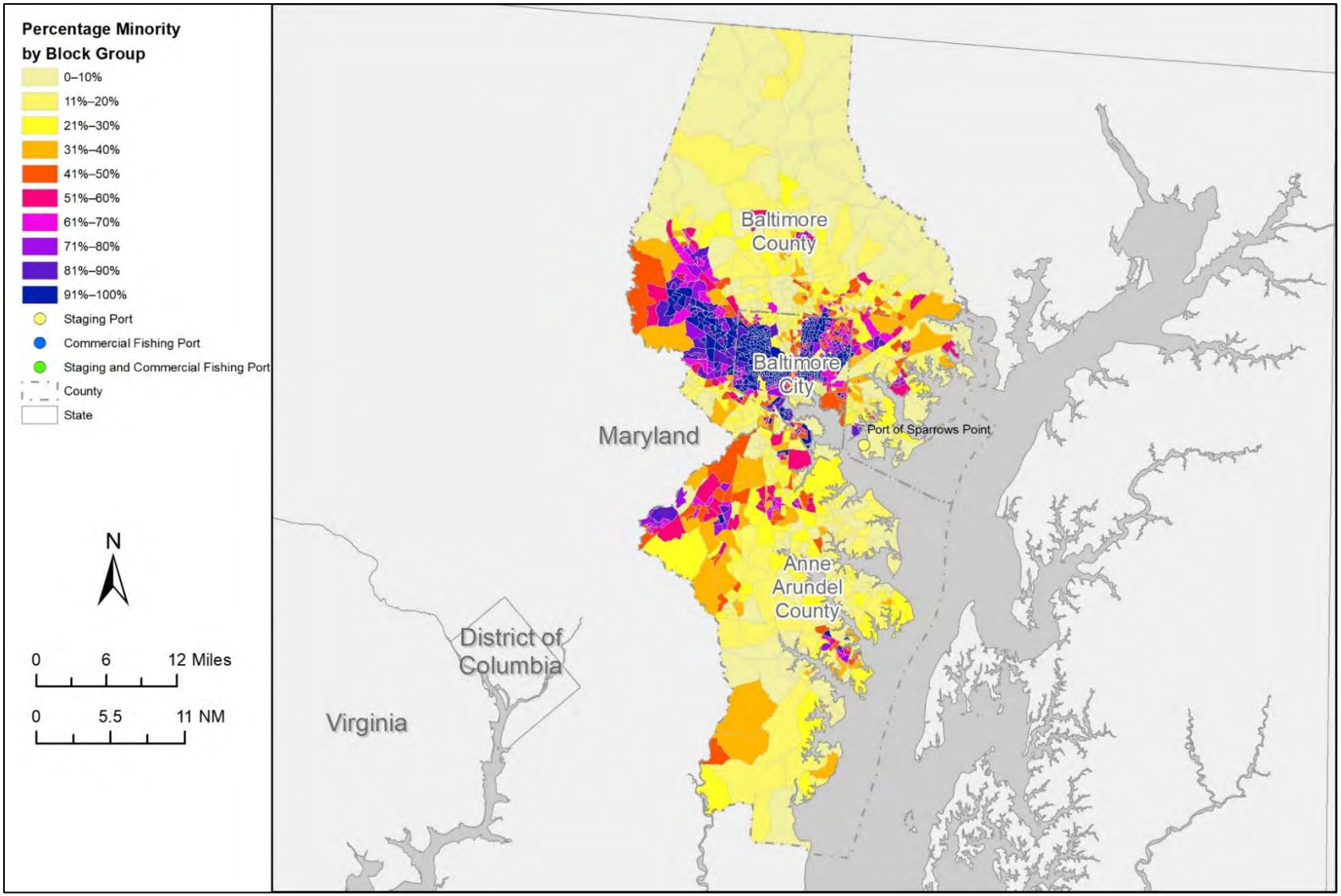
Source: Developed from information in EPA (2021).

Figure G-18. Distribution of minority populations by census block group in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.



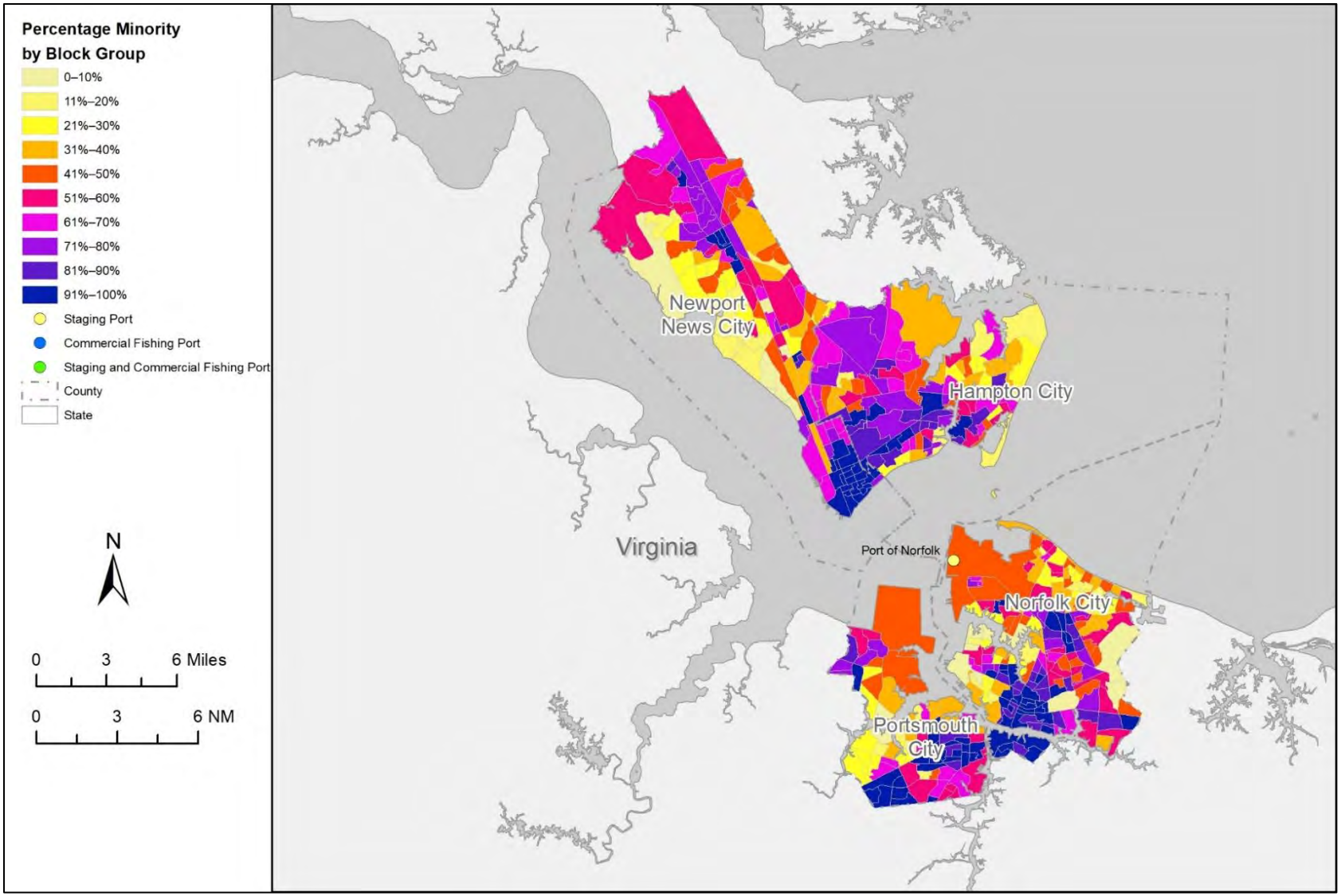
Source: Developed from information in EPA (2021).

Figure G-19. Distribution of minority populations by census block group in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.



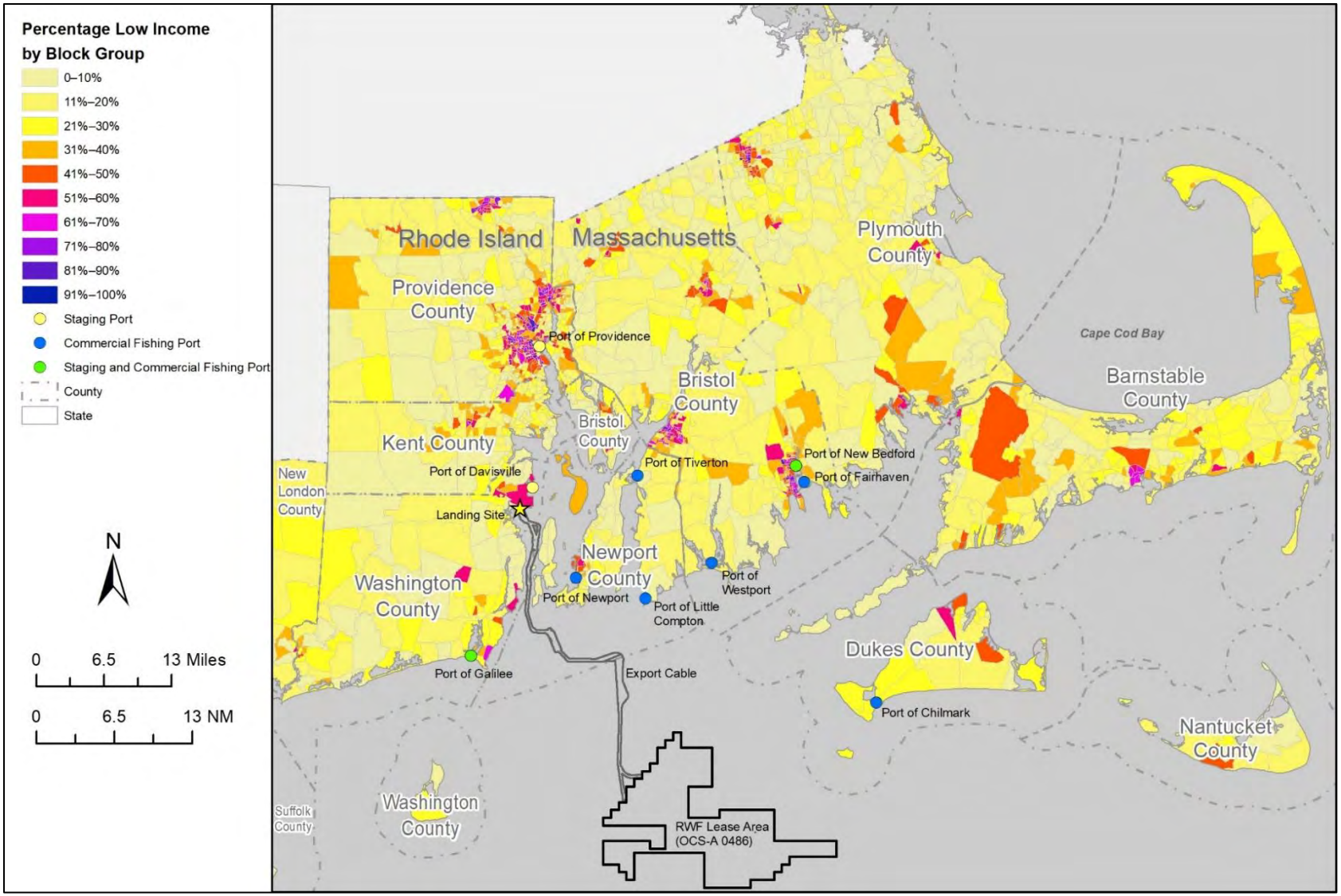
Source: Developed from information in EPA (2021).

Figure G-20. Distribution of minority populations by census block group in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.



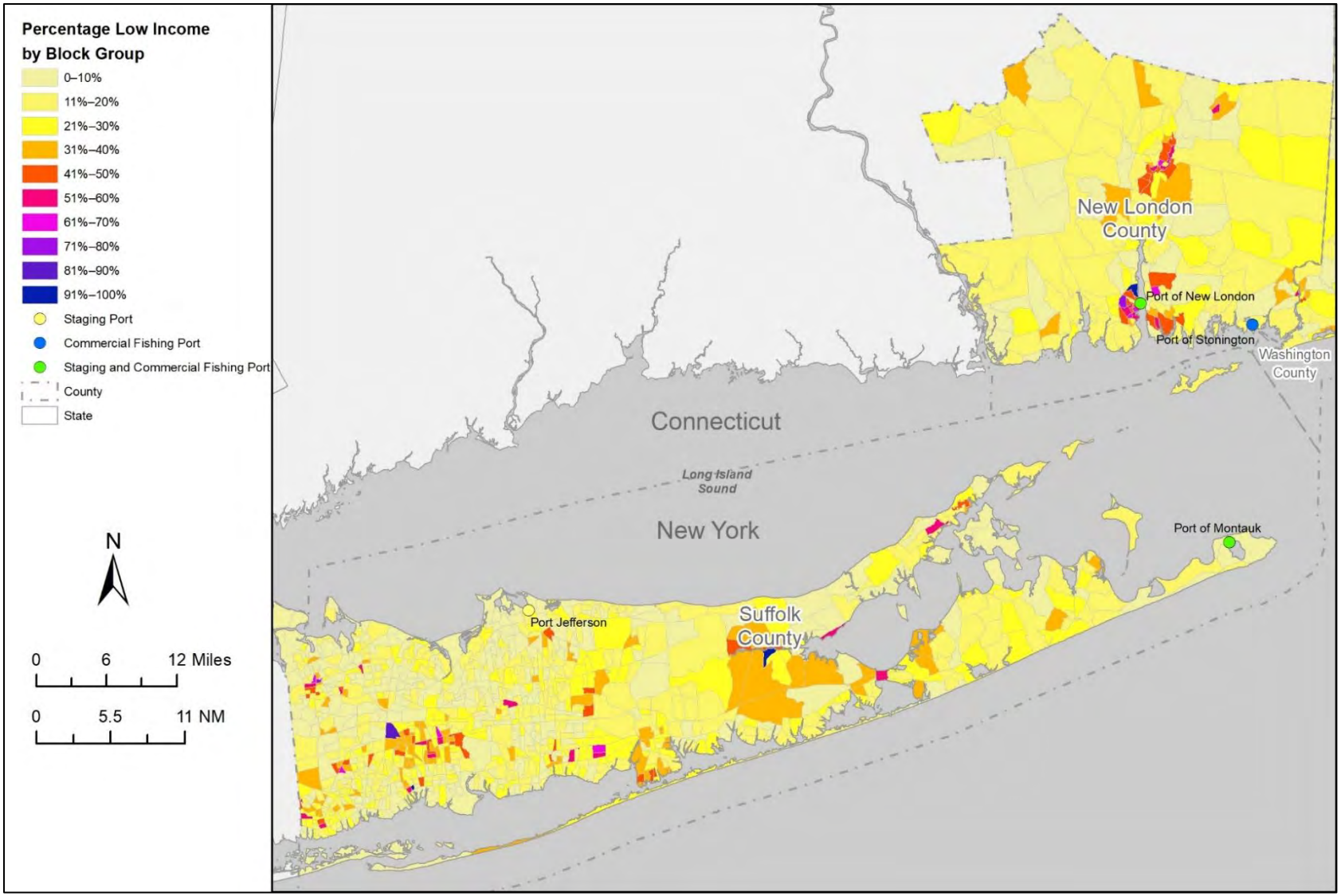
Source: Developed from information in EPA (2021).

Figure G-21. Distribution of minority populations by census block group in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.



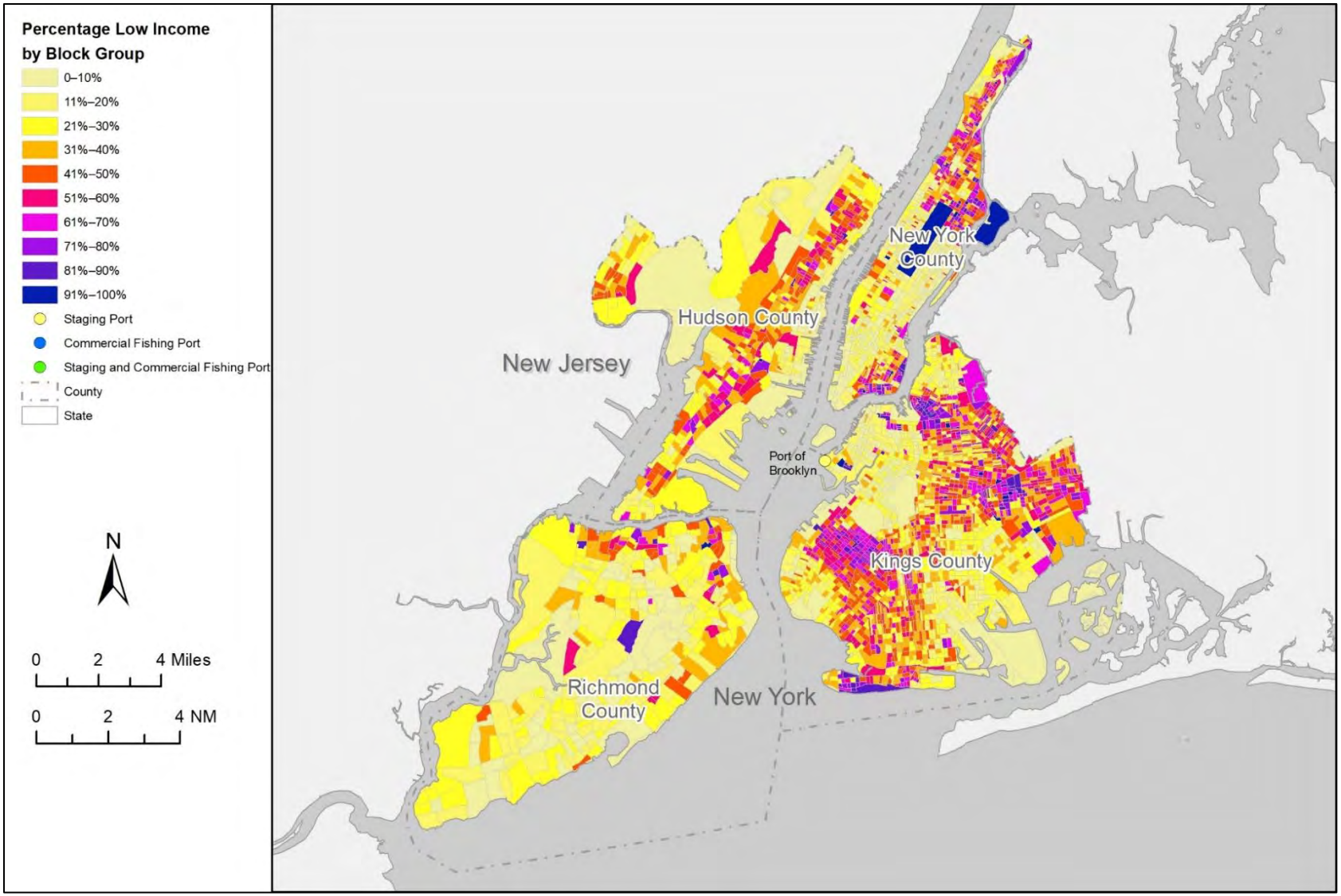
Source: Developed from information in EPA (2021).

Figure G-22. Distribution of low-income populations by census block group in potentially affected counties in Rhode Island and Massachusetts.



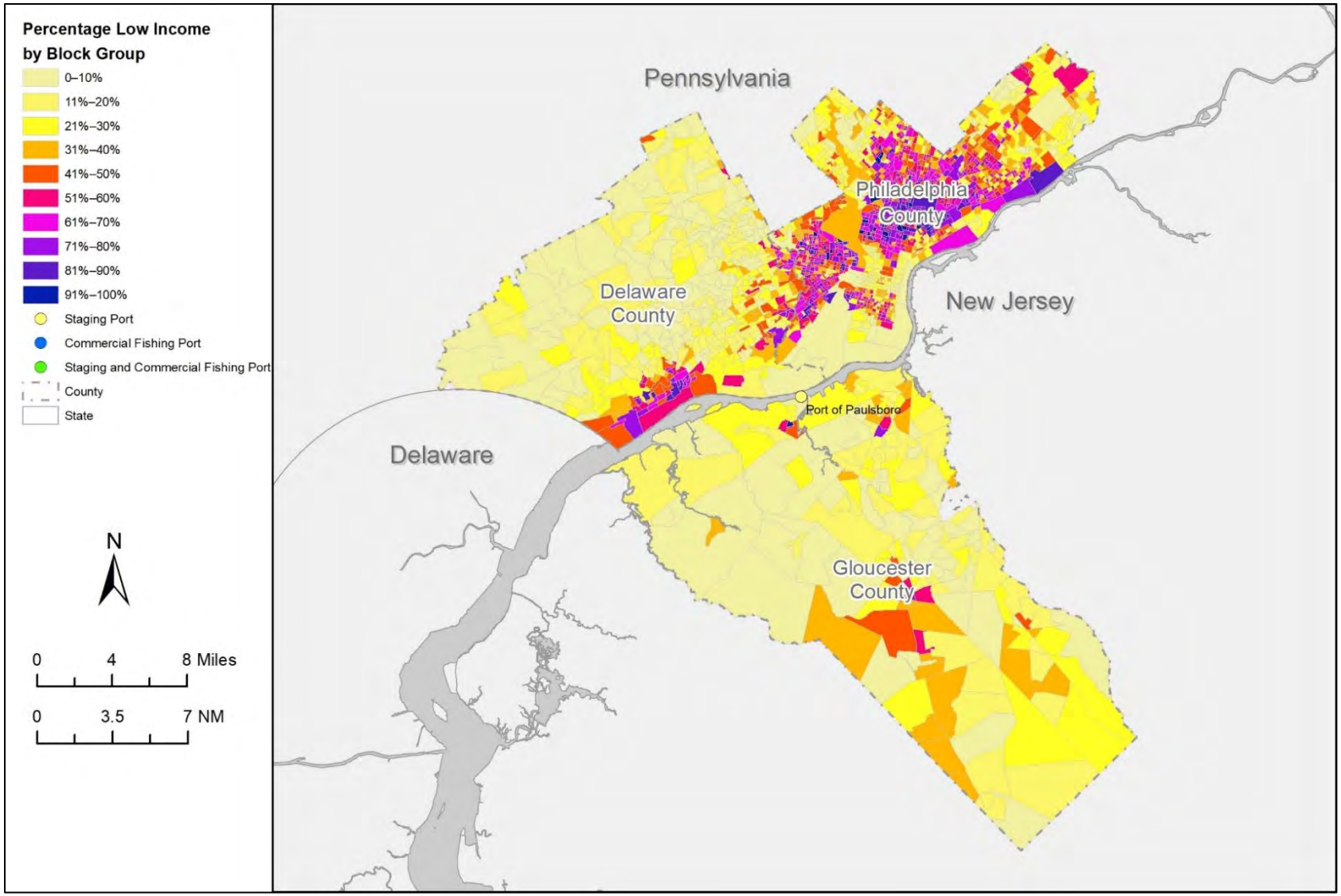
Source: Developed from information in EPA (2021).

Figure G-23. Distribution of low-income populations by census block group in New London County, Connecticut and Suffolk County, New York.



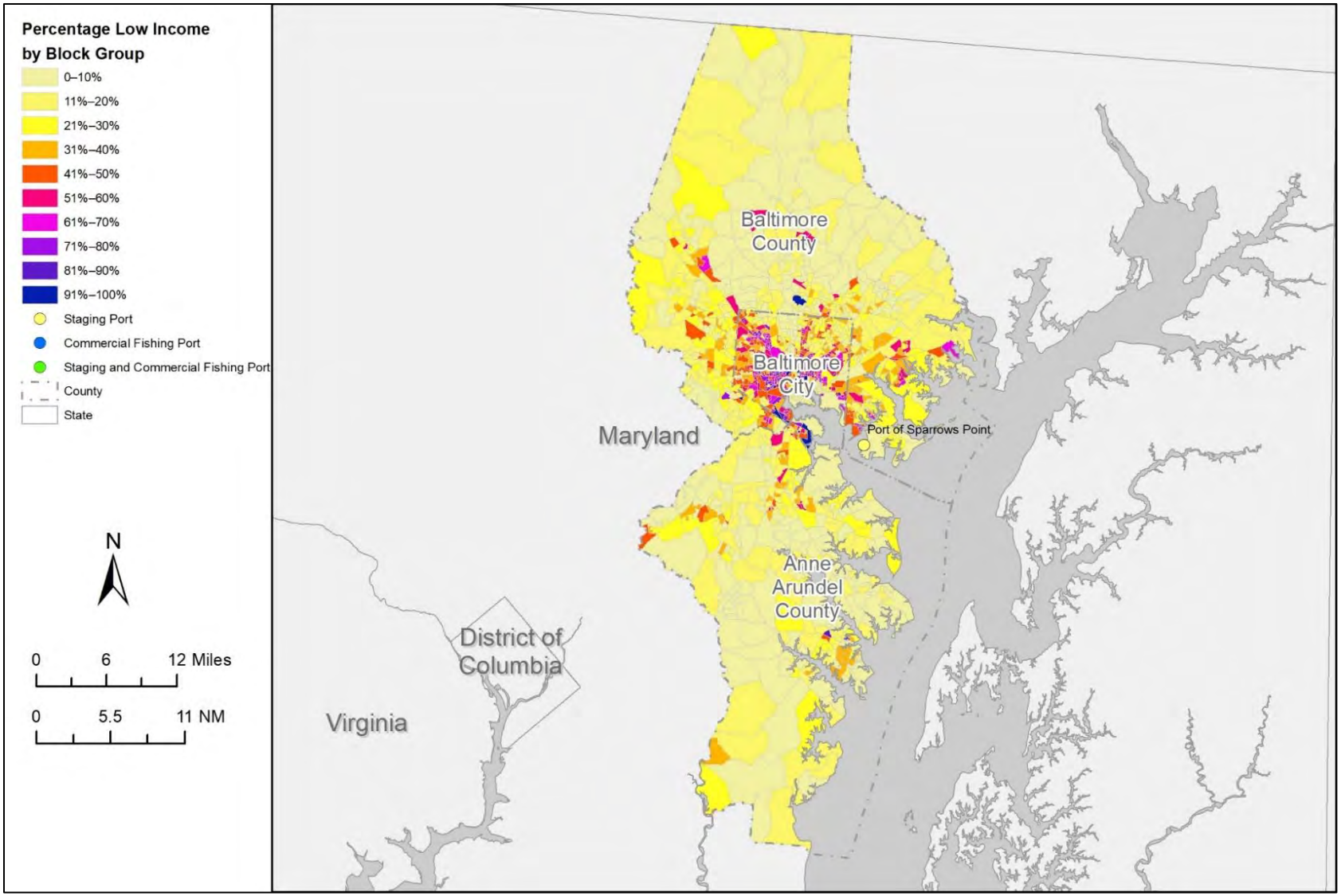
Source: Developed from information in EPA (2021).

Figure G-24. Distribution of low-income populations by census block group in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.



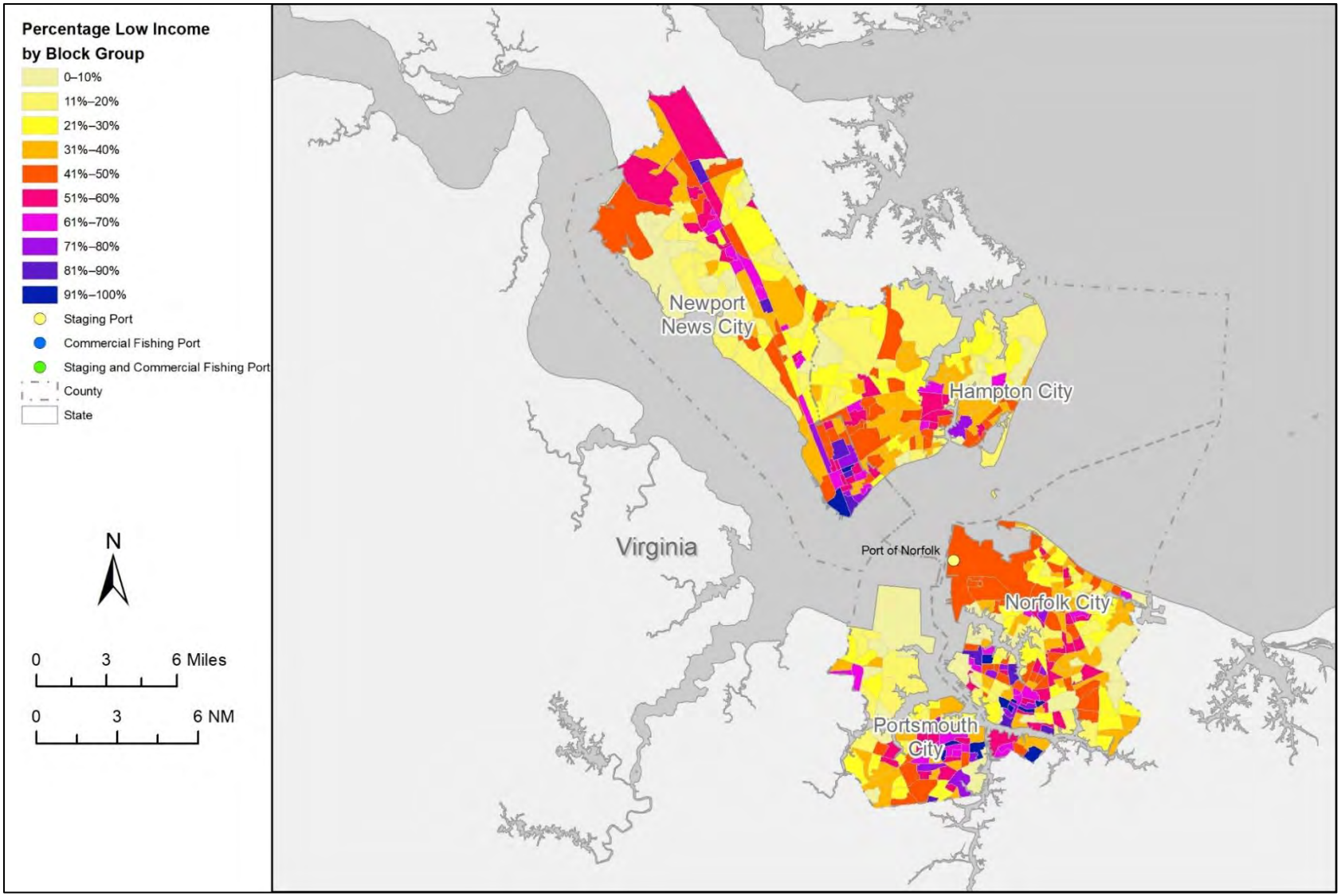
Source: Developed from information in EPA (2021).

Figure G-25. Distribution of low-income populations by census block group in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.



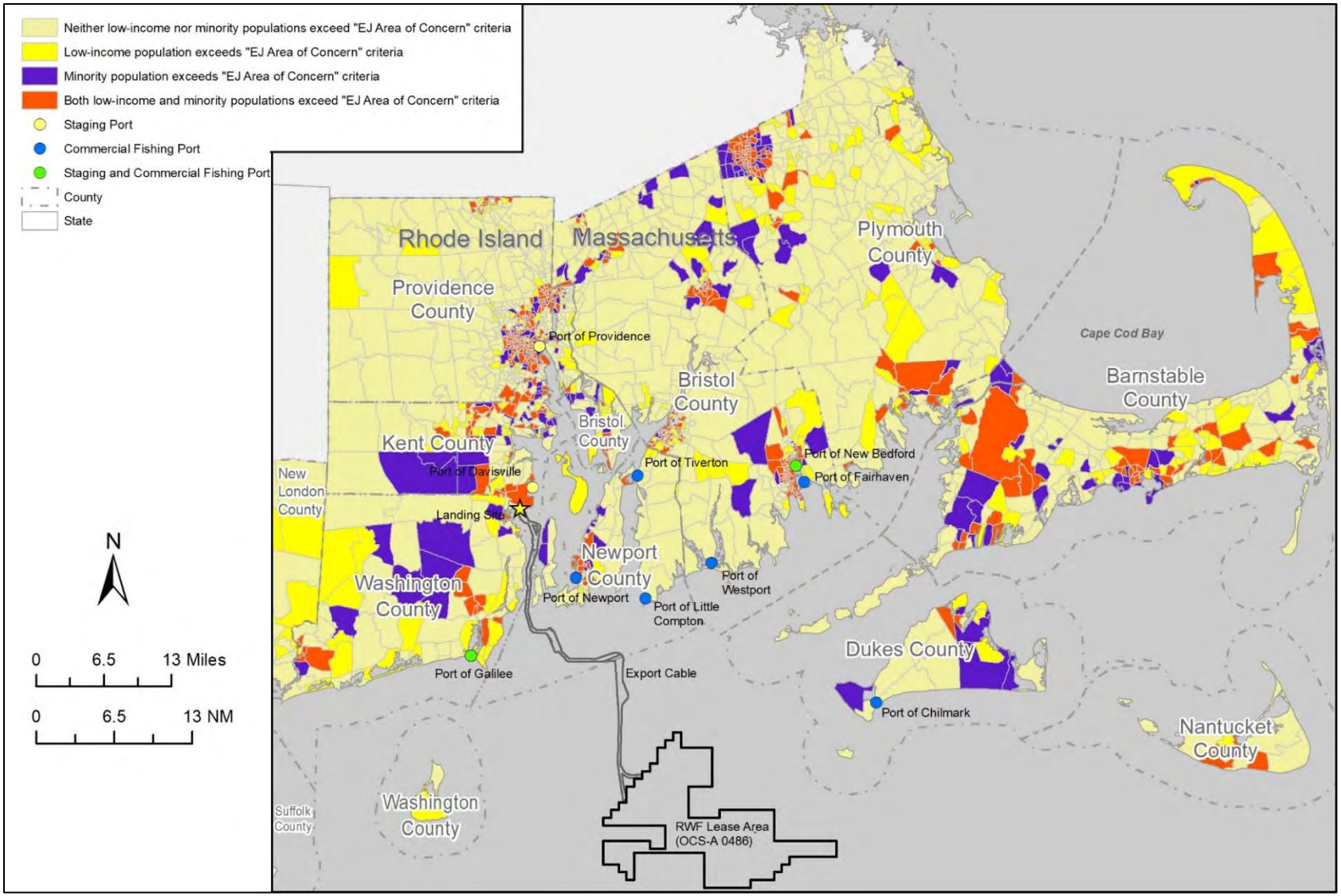
Source: Developed from information in EPA (2021).

Figure G-26. Distribution of low-income populations by census block group in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.



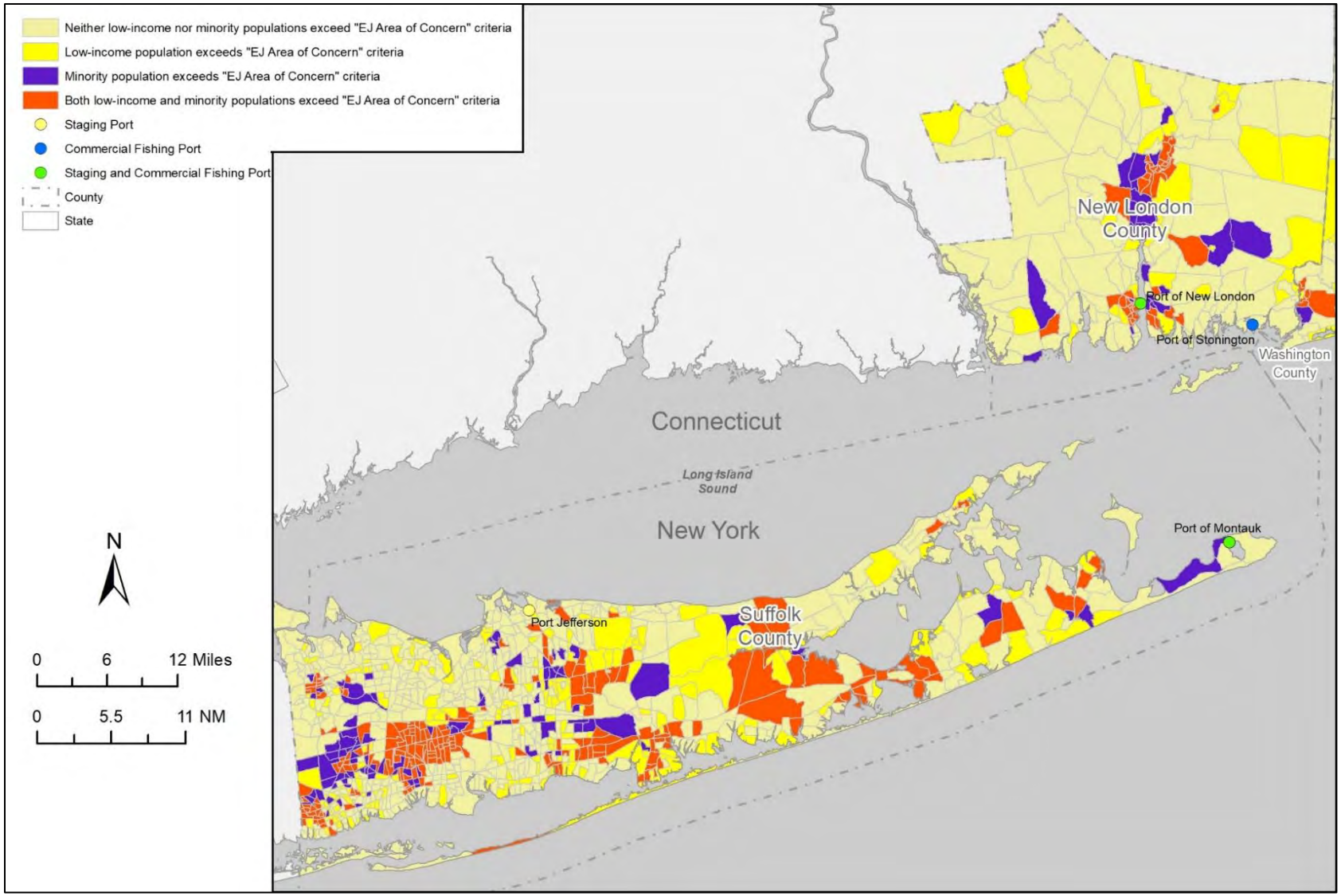
Source: Developed from information in EPA (2021).

Figure G-27. Distribution of low-income populations by census block group in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.



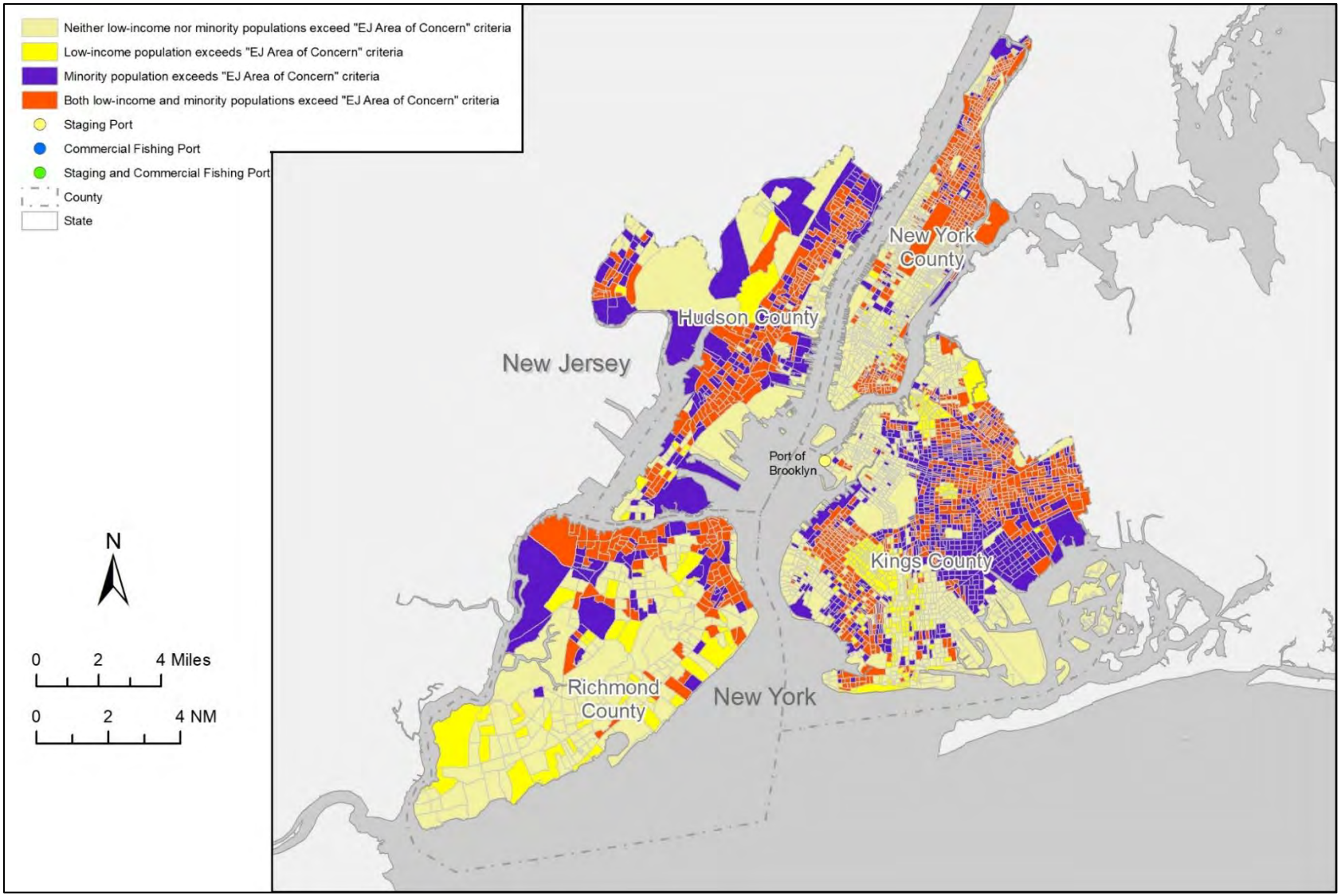
Source: Developed from information in EPA (2021).

Figure G-28. Census block groups that are potential environmental justice areas of concern in Rhode Island and Massachusetts.



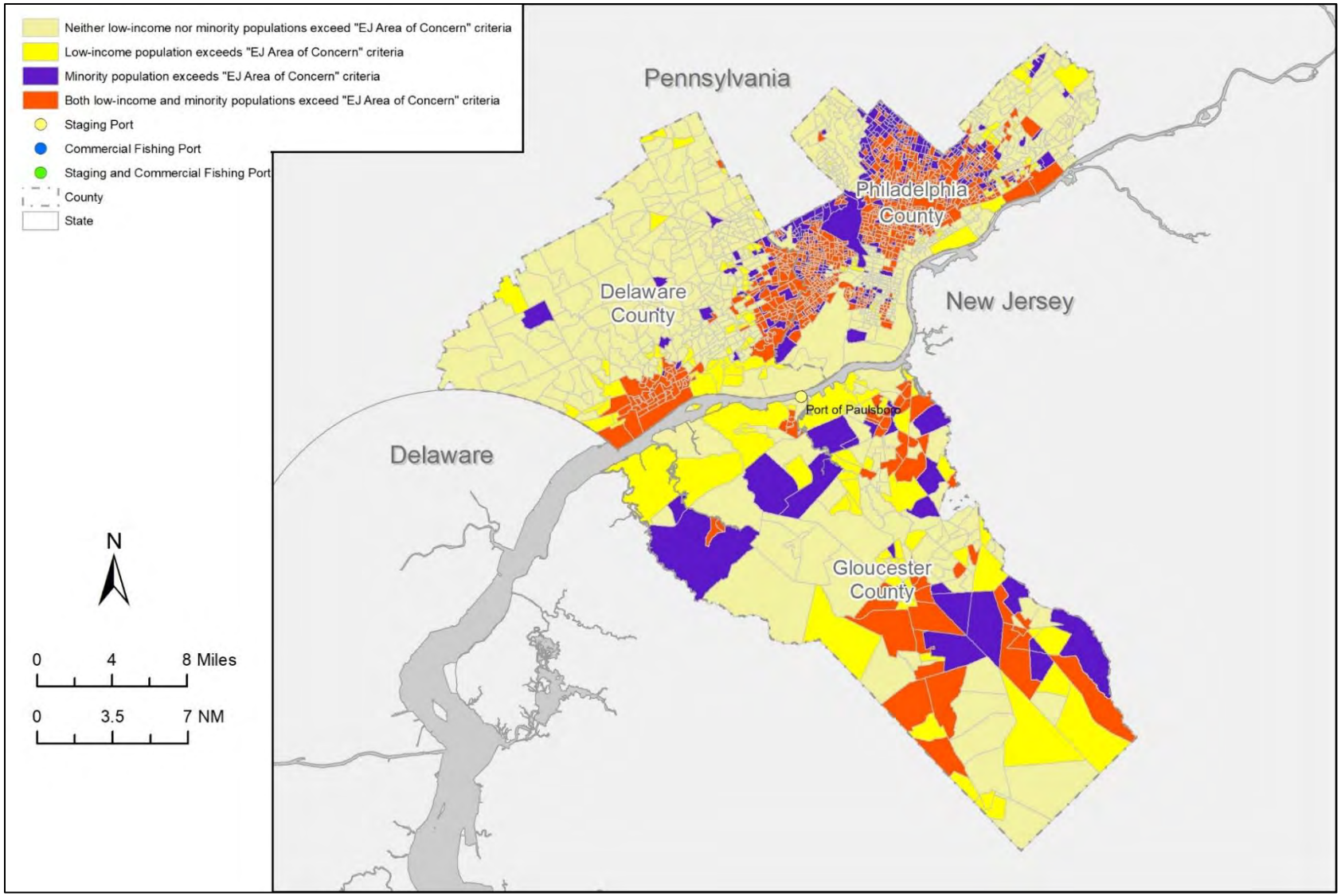
Source: Developed from information in EPA (2021).

Figure G-29. Census block groups that are potential environmental justice areas of concern in New London County, Connecticut and Suffolk County, New York.



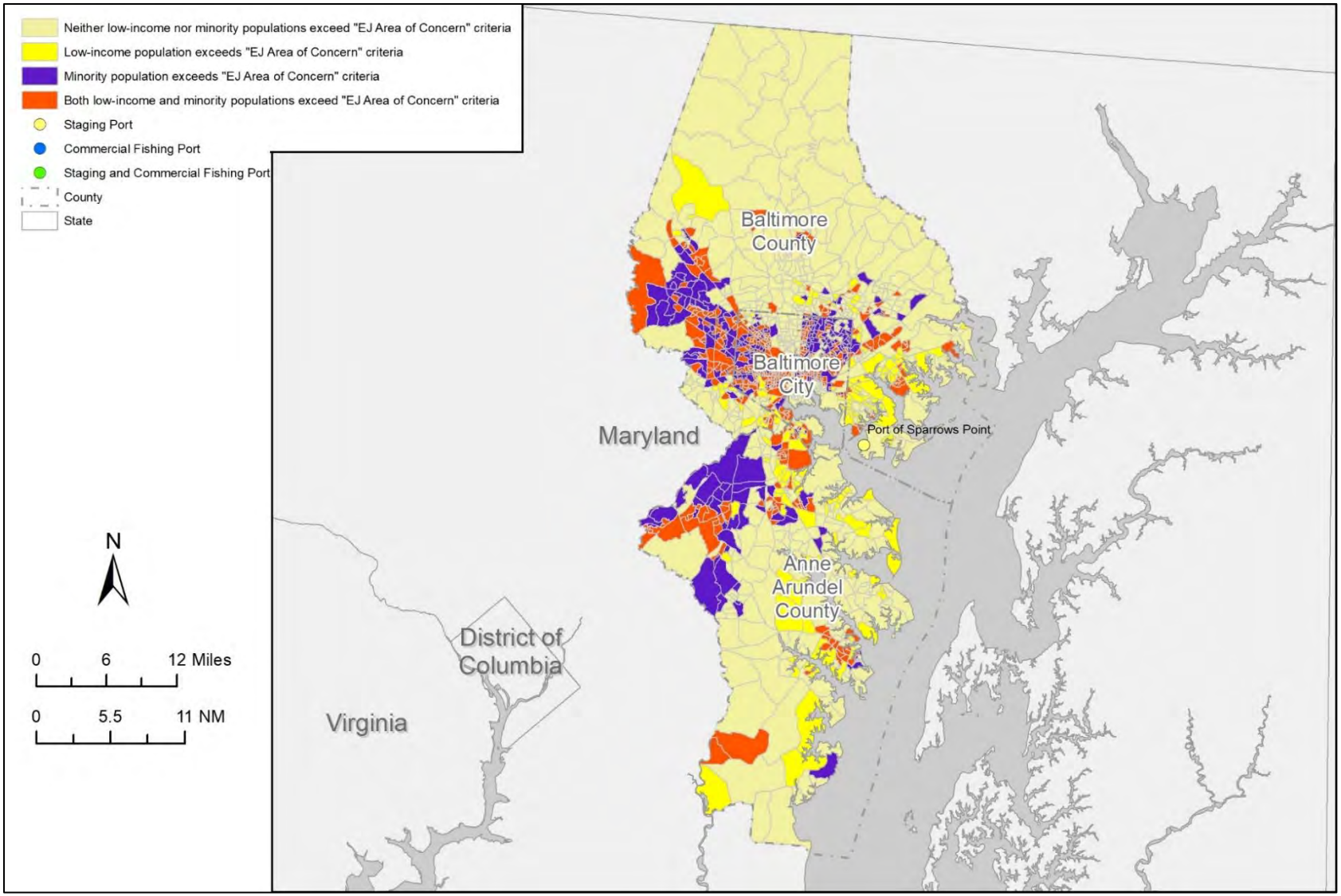
Source: Developed from information in EPA (2021).

Figure G-30. Census block groups that are potential environmental justice areas of concern in Kings County (Brooklyn), New York; Richmond County, New York; New York County, New York; and Hudson County, New Jersey.



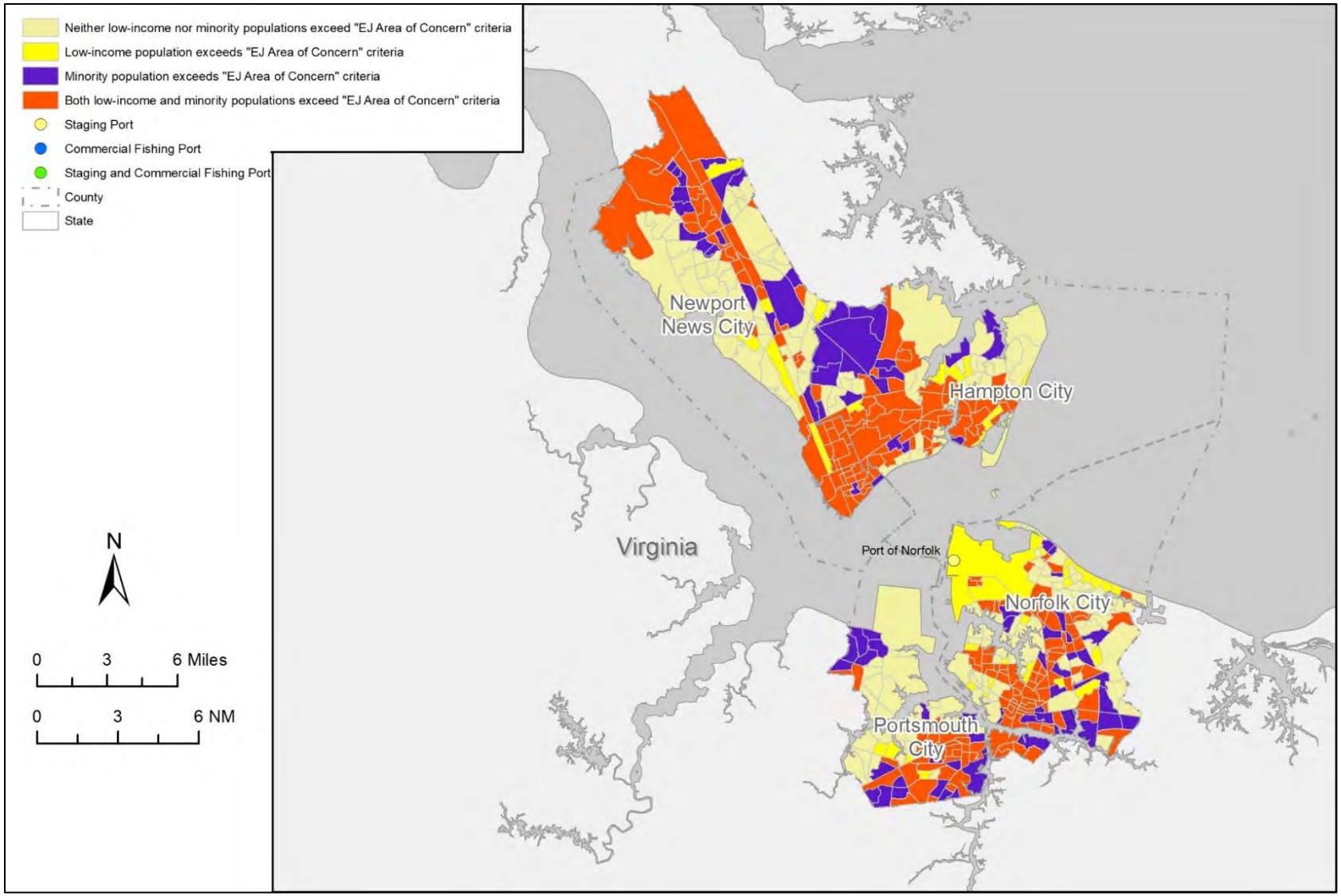
Source: Developed from information in EPA (2021).

Figure G-31. Census block groups that are potential environmental justice areas of concern in Gloucester County, New Jersey; Philadelphia County, Pennsylvania; and Delaware County, Pennsylvania.



Source: Developed from information in EPA (2021).

Figure G-32. Census block groups that are potential environmental justice areas of concern in Baltimore County, Baltimore City, and Anne Arundel County, Maryland.



Source: Developed from information in EPA (2021).

Figure G-33. Census block groups that are potential environmental justice areas of concern in the cities of Norfolk, Portsmouth, Newport News, and Hampton, Virginia.

Table G-EJ1. Census Tracts (CT) and Block Groups (BG) in Plymouth County, Massachusetts (County ID 25-023) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 5001.01 BG 3	Hull	2
CT 5021.01 BG 4	Rockland	2
CT 5021.02 BG 3	Rockland	1
CT 5031.02 BG 3	Hanover	2
CT 5031.02 BG 5	Hanover	2
CT 5031.02 BG 6	Hanover	2
CT 5051.01 BG 4	Scituate	3
CT 5052 BG 1	Scituate	2
CT 5052 BG 2	Scituate	2
CT 5061.01 BG 3	Marshfield	2
CT 5061.02 BG 1	Marshfield	2
CT 5061.02 BG 3	Marshfield	1
CT 5061.02 BG 4	Marshfield	2
CT 5062.02 BG 1	Marshfield	2
CT 5062.03 BG 1	Marshfield	2
CT 5062.04 BG 2	Marshfield	2
CT 5081.02 BG 1	Pembroke	2
CT 5091.01 BG 3	Kingston	2
CT 5091.02 BG 1	Kingston	2
CT 5101 BG 1	Brockton	1
CT 5101 BG 2	Brockton	3
CT 5101 BG 3	Brockton	3
CT 5101 BG 4	Brockton	1
CT 5102 BG 1	Brockton	3
CT 5102 BG 2	Brockton	3
CT 5102 BG 3	Brockton	3
CT 5102 BG 4	Brockton	1
CT 5103 BG 1	Brockton	1
CT 5103 BG 2	Brockton	1
CT 5103 BG 3	Brockton	1
CT 5104 BG 1	Brockton	1
CT 5104 BG 2	Brockton	1
CT 5104 BG 3	Brockton	1
CT 5104 BG 4	Brockton	1
CT 5105.01 BG 1	Brockton	1
CT 5105.01 BG 2	Brockton	1
CT 5105.02 BG 1	Brockton	1
CT 5105.02 BG 2	Brockton	1
CT 5105.02 BG 3	Brockton	1
CT 5105.02 BG 4	Brockton	1
CT 5105.02 BG 5	Brockton	1
CT 5105.03 BG 1	Brockton	1
CT 5105.03 BG 2	Brockton	1
CT 5105.03 BG 3	Brockton	3
CT 5106 BG 1	Brockton	1
CT 5106 BG 2	Brockton	3
CT 5106 BG 3	Brockton	3
CT 5107 BG 1	Brockton	1
CT 5107 BG 2	Brockton	1
CT 5107 BG 3	Brockton	3
CT 5107 BG 4	Brockton	1
CT 5107 BG 5	Brockton	1
CT 5107 BG 6	Brockton	1
CT 5108 BG 1	Brockton	1
CT 5108 BG 2	Brockton	1
CT 5108 BG 3	Brockton	1
CT 5108 BG 4	Brockton	1
CT 5108 BG 5	Brockton	1
CT 5108 BG 6	Brockton	1
CT 5109 BG 1	Brockton	1
CT 5109 BG 2	Brockton	1
CT 5109 BG 3	Brockton	1
CT 5110 BG 1	Brockton	1
CT 5110 BG 2	Brockton	1
CT 5111 BG 1	Brockton	3
CT 5111 BG 2	Brockton	1
CT 5111 BG 3	Brockton	3
CT 5111 BG 4	Brockton	1
CT 5111 BG 5	Brockton	3
CT 5111 BG 6	Brockton	3
CT 5112 BG 1	Brockton	1
CT 5112 BG 2	Brockton	3
CT 5112 BG 3	Brockton	1
CT 5112 BG 4	Brockton	3
CT 5112 BG 5	Brockton	1
CT 5113.01 BG 1	Brockton	1
CT 5113.01 BG 2	Brockton	3
CT 5113.01 BG 3	Brockton	1
CT 5113.01 BG 4	Brockton	1
CT 5113.01 BG 5	Brockton	3
CT 5113.02 BG 1	East Bridgewater	1
CT 5113.02 BG 2	Brockton	3
CT 5113.02 BG 3	Brockton	1
CT 5113.02 BG 4	Brockton	1
CT 5114 BG 1	Brockton	1
CT 5114 BG 2	Brockton	1

Census Tract & Block Group ID	Place Name	Category
CT 5114 BG 3	Brockton	1
CT 5114 BG 4	Brockton	1
CT 5115 BG 1	Brockton	1
CT 5115 BG 2	Brockton	1
CT 5115 BG 3	Brockton	1
CT 5115 BG 4	Brockton	1
CT 5116 BG 1	Brockton	1
CT 5116 BG 2	Brockton	1
CT 5116 BG 3	Brockton	1
CT 5116 BG 4	Brockton	3
CT 5116 BG 5	Brockton	3
CT 5116 BG 6	Brockton	1
CT 5116 BG 7	Brockton	2
CT 5117.01 BG 1	Brockton	3
CT 5117.01 BG 2	Brockton	3
CT 5117.01 BG 3	Brockton	3
CT 5117.01 BG 4	Brockton	3
CT 5117.01 BG 5	Brockton	3
CT 5117.02 BG 1	Brockton	3
CT 5117.02 BG 2	Brockton	3
CT 5201 BG 1	Abington	2
CT 5202.01 BG 1	Abington	3
CT 5202.01 BG 2	Abington	1
CT 5202.02 BG 1	Abington	2
CT 5211.01 BG 2	Whitman	2
CT 5211.02 BG 1	Whitman	2
CT 5211.02 BG 2	Whitman	2
CT 5212.01 BG 3	Whitman	2
CT 5221.02 BG 4	Hanson	2
CT 5231 BG 1	East Bridgewater	1
CT 5232.01 BG 1	East Bridgewater	2
CT 5232.02 BG 1	East Bridgewater	2
CT 5232.02 BG 2	East Bridgewater	1
CT 5241.01 BG 3	West Bridgewater	2
CT 5241.02 BG 1	West Bridgewater	2
CT 5251.01 BG 1	Bridgewater	3
CT 5251.01 BG 2	Bridgewater	3
CT 5251.01 BG 3	Bridgewater	2
CT 5251.01 BG 4	Bridgewater	2
CT 5251.04 BG 3	Bridgewater	2
CT 5252.03 BG 2	Bridgewater	2
CT 5252.03 BG 3	Bridgewater	1
CT 5252.04 BG 1	Bridgewater	3

Census Tract & Block Group ID	Place Name	Category
CT 5253 BG 1	Bridgewater	3
CT 5301 BG 2	Plymouth	1
CT 5302 BG 1	Plymouth	2
CT 5302 BG 2	Plymouth	2
CT 5302 BG 3	Plymouth	2
CT 5303 BG 2	Plymouth	1
CT 5303 BG 3	Plymouth	2
CT 5303 BG 4	Plymouth	2
CT 5305 BG 1	Plymouth	2
CT 5305 BG 3	Plymouth	1
CT 5305 BG 5	Plymouth	2
CT 5306 BG 1	Plymouth	3
CT 5308.01 BG 2	Plymouth	2
CT 5308.02 BG 5	Plymouth	2
CT 5309.01 BG 4	Plymouth	2
CT 5401.01 BG 2	Lakeville	2
CT 5423 BG 1	Middleborough	2
CT 5423 BG 2	Middleborough	2
CT 5423 BG 4	Middleborough	1
CT 5423 BG 5	Middleborough	2
CT 5423 BG 6	Middleborough	2
CT 5441 BG 1	Carver	3
CT 5441 BG 4	Carver	2
CT 5442 BG 1	Carver	2
CT 5442 BG 3	Carver	2
CT 5442 BG 4	Carver	2
CT 5451 BG 1	Wareham	1
CT 5451 BG 2	Wareham	2
CT 5451 BG 4	Wareham	2
CT 5452 BG 1	Wareham	3
CT 5452 BG 2	Wareham	3
CT 5452 BG 3	Wareham	1
CT 5452 BG 4	Wareham	1
CT 5453 BG 1	Wareham	1
CT 5453 BG 3	Wareham	2
CT 5453 BG 4	Wareham	2
CT 5454 BG 1	Wareham	1
CT 5454 BG 2	Wareham	2
CT 5454 BG 5	Wareham	1
CT 5601 BG 4	Mattapoisett	1
CT 5611 BG 4	Marion	2
CT 5611 BG 5	Marion	1
CT 5612 BG 1	Bridgewater	1

Table G-EJ2. Census Tracts (CT) and Block Groups (BG) in Bristol County, Massachusetts (County ID 25-005) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 6002.02 BG 2	Easton	3
CT 6002.02 BG 3	Easton	2
CT 6002.03 BG 2	Easton	3
CT 6101 BG 3	Mansfield	3
CT 6102.03 BG 3	Mansfield	3
CT 6102.04 BG 3	Mansfield	3
CT 6122 BG 2	Raynham	3
CT 6131 BG 1	Taunton	2
CT 6131 BG 2	Taunton	3
CT 6131 BG 3	Taunton	2
CT 6131 BG 4	Taunton	3
CT 6133 BG 2	Taunton	3
CT 6134 BG 2	Taunton	1
CT 6136 BG 1	Taunton	1
CT 6136 BG 2	Taunton	2
CT 6137 BG 2	Taunton	1
CT 6138 BG 1	Taunton	1
CT 6138 BG 2	Taunton	1
CT 6138 BG 3	Taunton	1
CT 6138 BG 4	Taunton	1
CT 6139.01 BG 2	Taunton	1
CT 6139.02 BG 1	Taunton	3
CT 6139.02 BG 2	Taunton	1
CT 6140 BG 1	Taunton	1
CT 6140 BG 2	Taunton	1
CT 6141.01 BG 1	Taunton	3
CT 6141.01 BG 2	Taunton	1
CT 6141.01 BG 3	Taunton	1
CT 6141.02 BG 1	Taunton	2
CT 6301.01 BG 1	North Attleborough	3
CT 6301.01 BG 2	North Attleborough	1
CT 6301.02 BG 2	North Attleborough	2
CT 6301.02 BG 3	North Attleborough	2
CT 6302 BG 4	North Attleborough	1
CT 6303 BG 3	North Attleborough	2
CT 6304 BG 3	North Attleborough	3
CT 6311 BG 1	Attleboro	3
CT 6311 BG 3	Attleboro	1
CT 6311 BG 4	Attleboro	2
CT 6311 BG 5	Attleboro	3
CT 6312 BG 3	Attleboro	1
CT 6312 BG 5	Attleboro	3
CT 6313 BG 3	Attleboro	2
CT 6314 BG 1	Attleboro	1
CT 6314 BG 2	Attleboro	3
CT 6315 BG 1	Attleboro	3
CT 6315 BG 2	Attleboro	2
CT 6316 BG 1	Attleboro	1
CT 6316 BG 2	Attleboro	3
CT 6316 BG 3	Attleboro	1
CT 6317 BG 1	Attleboro	1
CT 6317 BG 2	Attleboro	2
CT 6322 BG 2	Seekonk	2
CT 6401 BG 1	Fall River	1
CT 6401 BG 2	Fall River	1
CT 6401 BG 4	Fall River	1
CT 6401 BG 5	Tiverton	2
CT 6402 BG 1	Fall River	2
CT 6402 BG 2	Fall River	2
CT 6402 BG 3	Fall River	1
CT 6402 BG 4	Fall River	2
CT 6402 BG 5	Fall River	1
CT 6403 BG 1	Fall River	1
CT 6403 BG 2	Fall River	1
CT 6403 BG 3	Fall River	1
CT 6404 BG 1	Fall River	2
CT 6404 BG 2	Fall River	1
CT 6404 BG 3	Fall River	2
CT 6405 BG 1	Fall River	2
CT 6405 BG 2	Fall River	1
CT 6405 BG 3	Fall River	3
CT 6405 BG 4	Fall River	3
CT 6405 BG 5	Fall River	1
CT 6406 BG 1	Fall River	2
CT 6406 BG 2	Fall River	1
CT 6406 BG 3	Fall River	1
CT 6406 BG 4	Fall River	1
CT 6407 BG 1	Fall River	2
CT 6407 BG 2	Fall River	1
CT 6408 BG 1	Fall River	1
CT 6408 BG 2	Fall River	2
CT 6409.01 BG 1	Fall River	1
CT 6409.01 BG 2	Fall River	2
CT 6409.01 BG 3	Fall River	1
CT 6409.01 BG 4	Fall River	1
CT 6409.01 BG 5	Fall River	1

Census Tract & Block Group ID	Place Name	Category
CT 6410 BG 1	Fall River	1
CT 6410 BG 2	Fall River	1
CT 6410 BG 3	Fall River	1
CT 6411.01 BG 1	Fall River	1
CT 6411.01 BG 2	Fall River	1
CT 6412 BG 1	Fall River	1
CT 6412 BG 2	Fall River	2
CT 6413 BG 1	Fall River	1
CT 6413 BG 2	Fall River	1
CT 6413 BG 3	Fall River	1
CT 6413 BG 4	Fall River	1
CT 6413 BG 5	Fall River	1
CT 6414 BG 1	Fall River	1
CT 6414 BG 2	Fall River	1
CT 6414 BG 3	Fall River	1
CT 6415 BG 1	Fall River	1
CT 6415 BG 2	Fall River	2
CT 6416 BG 2	Fall River	2
CT 6417 BG 2	Fall River	2
CT 6417 BG 3	Fall River	2
CT 6417 BG 4	Fall River	1
CT 6418 BG 1	Fall River	3
CT 6418 BG 3	Fall River	2
CT 6419 BG 1	Fall River	1
CT 6419 BG 2	Fall River	1
CT 6420 BG 1	Fall River	2
CT 6420 BG 2	Fall River	1
CT 6420 BG 3	Fall River	1
CT 6421 BG 2	Fall River	1
CT 6421 BG 3	Fall River	3
CT 6422 BG 1	Fall River	2
CT 6422 BG 2	Fall River	1
CT 6422 BG 3	Fall River	1
CT 6422 BG 4	Fall River	2
CT 6424 BG 1	Fall River	1
CT 6442 BG 5	Somerset	2
CT 6451.01 BG 3	Swansea	2
CT 6451.02 BG 3	Swansea	2
CT 6461.01 BG 2	Westport	2
CT 6461.01 BG 3	Westport	2
CT 6501.02 BG 1	New Bedford	1
CT 6501.02 BG 2	New Bedford	2
CT 6501.02 BG 3	New Bedford	1
CT 6502.01 BG 3	New Bedford	1
CT 6502.02 BG 1	New Bedford	2
CT 6503 BG 1	New Bedford	3
CT 6503 BG 2	New Bedford	1
CT 6503 BG 3	New Bedford	1

Census Tract & Block Group ID	Place Name	Category
CT 6504 BG 1	New Bedford	2
CT 6504 BG 2	New Bedford	2
CT 6504 BG 3	New Bedford	1
CT 6505 BG 1	New Bedford	2
CT 6505 BG 2	New Bedford	2
CT 6505 BG 3	New Bedford	1
CT 6506 BG 1	New Bedford	1
CT 6506 BG 2	New Bedford	1
CT 6506 BG 3	New Bedford	1
CT 6507 BG 1	New Bedford	1
CT 6507 BG 2	New Bedford	1
CT 6508 BG 1	New Bedford	1
CT 6508 BG 2	New Bedford	1
CT 6508 BG 3	New Bedford	1
CT 6508 BG 4	New Bedford	1
CT 6509 BG 1	New Bedford	1
CT 6509 BG 2	New Bedford	1
CT 6509 BG 3	New Bedford	1
CT 6510.01 BG 1	New Bedford	1
CT 6510.02 BG 1	New Bedford	3
CT 6510.02 BG 2	New Bedford	1
CT 6511 BG 1	New Bedford	1
CT 6511 BG 2	New Bedford	1
CT 6511 BG 3	New Bedford	1
CT 6511 BG 4	New Bedford	2
CT 6512 BG 1	New Bedford	1
CT 6512 BG 2	New Bedford	1
CT 6513 BG 1	New Bedford	1
CT 6513 BG 2	New Bedford	1
CT 6514 BG 1	New Bedford	1
CT 6514 BG 2	New Bedford	1
CT 6514 BG 3	New Bedford	1
CT 6514 BG 4	New Bedford	1
CT 6515 BG 1	New Bedford	1
CT 6515 BG 2	New Bedford	1
CT 6515 BG 3	New Bedford	1
CT 6515 BG 4	New Bedford	1
CT 6516 BG 1	New Bedford	1
CT 6516 BG 2	New Bedford	1
CT 6516 BG 3	New Bedford	3
CT 6516 BG 4	New Bedford	1
CT 6517 BG 1	New Bedford	1
CT 6517 BG 2	New Bedford	1
CT 6518 BG 1	New Bedford	1
CT 6518 BG 2	New Bedford	1
CT 6519 BG 1	New Bedford	1
CT 6519 BG 2	New Bedford	1
CT 6520 BG 1	New Bedford	1

Census Tract & Block Group ID	Place Name	Category
CT 6520 BG 2	New Bedford	1
CT 6520 BG 3	New Bedford	1
CT 6521 BG 1	New Bedford	1
CT 6521 BG 3	New Bedford	1
CT 6523 BG 1	New Bedford	2
CT 6523 BG 2	New Bedford	1
CT 6524 BG 1	New Bedford	1
CT 6524 BG 2	New Bedford	1
CT 6525 BG 1	New Bedford	1
CT 6525 BG 2	New Bedford	1
CT 6526 BG 1	New Bedford	1
CT 6526 BG 2	New Bedford	1
CT 6527 BG 1	New Bedford	1
CT 6527 BG 2	New Bedford	1
CT 6527 BG 3	New Bedford	1
CT 6527 BG 4	New Bedford	1
CT 6528 BG 1	New Bedford	2
CT 6528 BG 3	New Bedford	1

Census Tract & Block Group ID	Place Name	Category
CT 6531.01 BG 3	Dartmouth	2
CT 6531.02 BG 2	Dartmouth	3
CT 6533.01 BG 3	Dartmouth	2
CT 6541 BG 3	Acushnet	3
CT 6541 BG 4	Acushnet	2
CT 6542 BG 1	Acushnet	2
CT 6542 BG 2	Acushnet	2
CT 6542 BG 3	Acushnet	1
CT 6552 BG 1	Fairhaven	3
CT 6552 BG 2	Fairhaven	2
CT 6552 BG 3	Fairhaven	1
CT 6552 BG 4	Fairhaven	2
CT 6552 BG 5	Fairhaven	1
CT 6553 BG 1	Fairhaven	2
CT 6553 BG 3	Fairhaven	2
CT 6554 BG 4	Fairhaven	2
CT 9855 BG 1	Dartmouth	3

Table G-EJ3. Census Tracts (CT) and Block Groups (BG) in Barnstable County, Massachusetts (County ID 25-001) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 101 BG 1	Provincetown	2
CT 101 BG 2	Provincetown	1
CT 101 BG 3	Provincetown	3
CT 101 BG 4	Provincetown	1
CT 102.06 BG 1	Wellfleet	2
CT 102.06 BG 2	Wellfleet	1
CT 102.06 BG 3	Wellfleet	2
CT 102.08 BG 2	Truro	2
CT 102.08 BG 3	Truro	2
CT 103.04 BG 2	Eastham	2
CT 103.04 BG 3	Eastham	3
CT 103.06 BG 1	Eastham	1
CT 103.06 BG 2	Eastham	1
CT 104 BG 2	Orleans	1
CT 105 BG 1	Orleans	2
CT 106 BG 3	Chatham	1
CT 107 BG 4	Chatham	2
CT 108 BG 1	Brewster	2
CT 108 BG 5	Brewster	2
CT 109 BG 2	Brewster	3

Census Tract & Block Group ID	Place Name	Category
CT 110.02 BG 3	Harwich	2
CT 110.02 BG 4	Harwich	1
CT 112 BG 1	Harwich	2
CT 112 BG 2	Harwich	1
CT 112 BG 3	Harwich	2
CT 112 BG 4	Harwich	2
CT 113 BG 1	Dennis	2
CT 114 BG 4	Dennis	1
CT 115 BG 1	Dennis	1
CT 115 BG 2	Dennis	2
CT 115 BG 4	Dennis	2
CT 115 BG 5	Dennis	1
CT 116 BG 1	Dennis	1
CT 116 BG 2	Dennis	2
CT 116 BG 3	Dennis	2
CT 117 BG 1	Dennis	1
CT 117 BG 3	Dennis	2
CT 118.02 BG 1	Yarmouth	2
CT 118.02 BG 3	Yarmouth	2
CT 118.02 BG 4	Yarmouth	1

Census Tract & Block Group ID	Place Name	Category
CT 120.01 BG 2	Yarmouth	2
CT 120.01 BG 4	Yarmouth	2
CT 120.02 BG 1	Yarmouth	1
CT 121.01 BG 1	Yarmouth	3
CT 121.01 BG 2	Yarmouth	3
CT 121.01 BG 3	Yarmouth	2
CT 121.01 BG 4	Yarmouth	1
CT 121.01 BG 5	Yarmouth	2
CT 121.02 BG 1	Yarmouth	1
CT 121.02 BG 2	Yarmouth	3
CT 121.02 BG 3	Yarmouth	2
CT 121.02 BG 4	Yarmouth	1
CT 125.02 BG 1	Barnstable	3
CT 125.02 BG 2	Barnstable	1
CT 125.02 BG 3	Barnstable	3
CT 125.02 BG 4	Barnstable	1
CT 126.01 BG 1	Barnstable	1
CT 126.01 BG 2	Barnstable	1
CT 126.02 BG 1	Barnstable	1
CT 126.02 BG 2	Barnstable	1
CT 126.02 BG 3	Barnstable	1
CT 126.02 BG 4	Barnstable	3
CT 127 BG 1	Barnstable	2
CT 127 BG 2	Barnstable	2
CT 127 BG 4	Barnstable	3
CT 128 BG 2	Barnstable	2
CT 129 BG 1	Barnstable	3
CT 130.02 BG 3	Barnstable	3
CT 131 BG 1	Barnstable	2
CT 133 BG 1	Sandwich	1
CT 135 BG 4	Sandwich	3
CT 136 BG 2	Sandwich	2
CT 136 BG 3	Sandwich	3

Census Tract & Block Group ID	Place Name	Category
CT 137 BG 4	Bourne	3
CT 138 BG 1	Bourne	3
CT 138 BG 2	Bourne	3
CT 138 BG 3	Bourne	3
CT 139 BG 1	Bourne	2
CT 139 BG 3	Bourne	1
CT 140.02 BG 3	Bourne	2
CT 140.02 BG 4	Bourne	1
CT 141 BG 1	Bourne	1
CT 144.02 BG 1	Falmouth	3
CT 144.02 BG 2	Falmouth	3
CT 144.02 BG 3	Falmouth	3
CT 145 BG 1	Falmouth	2
CT 145 BG 2	Falmouth	2
CT 145 BG 3	Falmouth	1
CT 146 BG 2	Falmouth	1
CT 146 BG 3	Falmouth	1
CT 146 BG 4	Falmouth	3
CT 147 BG 1	Falmouth	3
CT 147 BG 2	Falmouth	2
CT 147 BG 3	Falmouth	1
CT 148 BG 1	Falmouth	1
CT 148 BG 3	Falmouth	1
CT 148 BG 4	Falmouth	3
CT 149 BG 3	Falmouth	1
CT 150.01 BG 1	Mashpee	1
CT 150.01 BG 2	Mashpee	3
CT 150.02 BG 1	Mashpee	1
CT 150.02 BG 2	Mashpee	1
CT 151 BG 1	Mashpee	3
CT 153 BG 1	Barnstable	1
CT 153 BG 2	Barnstable	1
CT 153 BG 3	Barnstable	1

Table G-EJ4. Census Tracts (CT) and Block Groups (BG) in Nantucket County, Massachusetts (County ID 25-019) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 9501 BG 1	Nantucket	2
CT 9501 BG 2	Nantucket	1
CT 9502 BG 1	Nantucket	3

Census Tract & Block Group ID	Place Name	Category
CT 9502 BG 2	Nantucket	1
CT 9502 BG 4	Nantucket	1
CT 9504 BG 2	Nantucket	1

Table G-EJ5. Census Tracts (CT) and Block Groups (BG) in Dukes County, Massachusetts (County ID 25-007) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 2001 BG 1	Tisbury	2
CT 2001 BG 2	Tisbury	3
CT 2001 BG 4	Tisbury	1
CT 2001 BG 5	Tisbury	1
CT 2002 BG 1	Oak Bluffs	2
CT 2002 BG 2	Oak Bluffs	3
CT 2002 BG 3	Oak Bluffs	3
CT 2002 BG 4	Oak Bluffs	2
CT 2002 BG 5	Oak Bluffs	2
CT 2003 BG 2	Edgartown	3
CT 2003 BG 3	Edgartown	3
CT 2003 BG 4	Edgartown	2
CT 2004 BG 5	Aquinnah	3

Table G-EJ6. Census Tracts (CT) and Block Groups (BG) in Providence County, Rhode Island (County ID 44-007) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 1.01 BG 1	Providence	1
CT 1.01 BG 2	Providence	1
CT 1.01 BG 3	Providence	1
CT 1.01 BG 4	Providence	3
CT 1.02 BG 1	Providence	1
CT 1.02 BG 2	Providence	1
CT 1.02 BG 3	Providence	1
CT 1.02 BG 4	Providence	1
CT 10 BG 1	Providence	1
CT 10 BG 2	Providence	1
CT 101.02 BG 2	East Providence	2
CT 102 BG 2	East Providence	2
CT 102 BG 3	East Providence	3
CT 102 BG 4	East Providence	3
CT 102 BG 5	East Providence	2
CT 102 BG 6	East Providence	1
CT 102 BG 7	East Providence	3
CT 103 BG 1	East Providence	2
CT 104 BG 1	East Providence	2
CT 104 BG 2	East Providence	3
CT 104 BG 5	East Providence	2
CT 105.01 BG 1	East Providence	2
CT 105.02 BG 3	East Providence	2
CT 105.02 BG 4	East Providence	3
CT 106 BG 1	East Providence	2
CT 106 BG 6	East Providence	2
CT 107.02 BG 4	East Providence	2
CT 108 BG 1	Central Falls	1
CT 108 BG 2	Central Falls	1
CT 108 BG 3	Central Falls	1
CT 109 BG 1	Central Falls	1
CT 109 BG 2	Central Falls	1
CT 109 BG 3	Central Falls	1
CT 11 BG 1	Providence	1
CT 11 BG 2	Providence	2
CT 11 BG 3	Providence	2
CT 110 BG 1	Central Falls	1
CT 110 BG 2	Central Falls	1
CT 110 BG 3	Central Falls	1
CT 111 BG 1	Central Falls	1
CT 111 BG 2	Central Falls	1
CT 112 BG 5	Cumberland	2
CT 115 BG 4	Lincoln	2
CT 117.01 BG 2	Lincoln	2
CT 117.02 BG 1	Lincoln	2
CT 118 BG 2	North Providence	2
CT 118 BG 3	North Providence	2
CT 118 BG 4	North Providence	1
CT 119.01 BG 2	North Providence	3
CT 12 BG 1	Providence	1
CT 12 BG 2	Providence	1
CT 12 BG 3	Providence	1
CT 120 BG 2	North Providence	2
CT 120 BG 4	North Providence	2
CT 121.04 BG 2	North Providence	2
CT 123 BG 1	Johnston	2
CT 124.01 BG 1	Johnston	3
CT 125 BG 1	Johnston	2
CT 126.02 BG 2	Smithfield	2
CT 129 BG 1	Burrillville	2

Census Tract & Block Group ID	Place Name	Category
CT 13 BG 1	Providence	1
CT 13 BG 2	Providence	1
CT 13 BG 3	Providence	1
CT 13 BG 4	Providence	1
CT 130.02 BG 4	Burrillville	2
CT 131.01 BG 2	Glocester	2
CT 135 BG 2	Cranston	1
CT 135 BG 3	Cranston	2
CT 135 BG 4	Cranston	1
CT 135 BG 5	Cranston	3
CT 136 BG 2	Warwick	1
CT 137.01 BG 1	Cranston	3
CT 137.01 BG 2	Cranston	3
CT 137.01 BG 4	Cranston	2
CT 137.02 BG 1	Cranston	2
CT 137.02 BG 2	Cranston	2
CT 14 BG 1	Providence	1
CT 14 BG 2	Providence	1
CT 14 BG 3	Providence	3
CT 14 BG 4	Providence	1
CT 14 BG 5	Providence	1
CT 140 BG 2	Cranston	2
CT 140 BG 3	Cranston	1
CT 140 BG 4	Cranston	3
CT 141 BG 1	Cranston	1
CT 141 BG 2	Cranston	1
CT 141 BG 3	Cranston	2
CT 141 BG 4	Cranston	3
CT 142 BG 2	Cranston	1
CT 145.02 BG 3	Cranston	2
CT 147 BG 1	Cranston	3
CT 147 BG 2	Cranston	1
CT 147 BG 3	Cranston	1
CT 147 BG 4	Cranston	2
CT 147 BG 5	Cranston	2
CT 147 BG 6	Cranston	3
CT 148 BG 3	Cranston	2
CT 15 BG 1	Providence	1
CT 15 BG 2	Providence	1
CT 15 BG 3	Providence	3
CT 150 BG 1	Pawtucket	3
CT 150 BG 2	Pawtucket	1
CT 151 BG 1	Pawtucket	1
CT 151 BG 2	Pawtucket	1
CT 151 BG 3	Pawtucket	1
CT 152 BG 1	Pawtucket	1
CT 152 BG 2	Pawtucket	1
CT 153 BG 1	Pawtucket	1
CT 153 BG 2	Pawtucket	2
CT 154 BG 1	Pawtucket	1
CT 154 BG 2	Pawtucket	1
CT 155 BG 2	Pawtucket	1
CT 155 BG 3	Pawtucket	1
CT 155 BG 4	Pawtucket	3

Census Tract & Block Group ID	Place Name	Category
CT 156 BG 1	Pawtucket	1
CT 156 BG 3	Pawtucket	2
CT 159 BG 1	Pawtucket	3
CT 159 BG 2	Pawtucket	2
CT 159 BG 3	Pawtucket	3
CT 159 BG 4	Pawtucket	2
CT 16 BG 1	Providence	1
CT 16 BG 2	Providence	1
CT 16 BG 3	Providence	1
CT 16 BG 4	Providence	1
CT 16 BG 5	Providence	1
CT 16 BG 6	Providence	1
CT 16 BG 7	Providence	3
CT 160 BG 1	Pawtucket	1
CT 160 BG 2	Pawtucket	1
CT 160 BG 3	Pawtucket	3
CT 161 BG 1	Pawtucket	1
CT 161 BG 2	Pawtucket	3
CT 161 BG 3	Pawtucket	1
CT 161 BG 4	Pawtucket	1
CT 163 BG 1	Pawtucket	3
CT 163 BG 2	Pawtucket	3
CT 164 BG 1	Pawtucket	1
CT 164 BG 2	Pawtucket	1
CT 164 BG 3	Pawtucket	1
CT 165 BG 2	Pawtucket	2
CT 166 BG 1	Pawtucket	1
CT 167 BG 1	Pawtucket	1
CT 167 BG 2	Pawtucket	1
CT 168 BG 3	Pawtucket	2
CT 17 BG 1	Providence	3
CT 17 BG 2	Providence	1
CT 17 BG 3	Providence	1
CT 170 BG 4	Pawtucket	3
CT 171 BG 1	Pawtucket	3
CT 171 BG 2	Pawtucket	3
CT 171 BG 3	Pawtucket	1
CT 171 BG 4	Pawtucket	2
CT 173 BG 1	Woonsocket	2
CT 173 BG 2	Woonsocket	2
CT 174 BG 1	Woonsocket	1
CT 174 BG 2	Woonsocket	2
CT 174 BG 3	Woonsocket	1
CT 175 BG 2	Woonsocket	2
CT 175 BG 3	Woonsocket	2
CT 176 BG 1	Woonsocket	1
CT 176 BG 2	Woonsocket	1
CT 178 BG 1	Woonsocket	2
CT 178 BG 2	Woonsocket	2
CT 178 BG 3	Woonsocket	1
CT 179 BG 1	Woonsocket	2
CT 179 BG 2	Woonsocket	2
CT 179 BG 3	Woonsocket	2
CT 18 BG 1	Providence	1

Census Tract & Block Group ID	Place Name	Category
CT 18 BG 2	Providence	1
CT 18 BG 3	Providence	1
CT 18 BG 4	Providence	1
CT 18 BG 5	Providence	1
CT 18 BG 6	Providence	1
CT 180 BG 1	Woonsocket	1
CT 180 BG 2	Woonsocket	1
CT 180 BG 3	Woonsocket	2
CT 181 BG 1	Woonsocket	1
CT 181 BG 2	Woonsocket	1
CT 182 BG 2	Woonsocket	2
CT 183 BG 1	Woonsocket	1
CT 184 BG 1	Woonsocket	2
CT 184 BG 3	Woonsocket	1
CT 184 BG 5	Woonsocket	1
CT 185 BG 1	Woonsocket	2
CT 19 BG 1	Providence	1
CT 19 BG 2	Providence	1
CT 19 BG 3	Providence	1
CT 19 BG 4	Providence	3
CT 19 BG 5	Providence	1
CT 19 BG 6	Providence	1
CT 2 BG 1	Providence	3
CT 2 BG 2	Providence	1
CT 2 BG 3	Providence	1
CT 2 BG 4	Providence	1
CT 2 BG 5	Providence	1
CT 20 BG 1	Providence	1
CT 20 BG 2	Providence	1
CT 20 BG 3	Providence	1
CT 20 BG 4	Providence	3
CT 21.01 BG 1	Providence	1
CT 21.01 BG 2	Providence	3
CT 21.01 BG 3	Providence	1
CT 21.02 BG 1	Providence	3
CT 21.02 BG 2	Providence	1
CT 21.02 BG 3	Providence	1
CT 21.02 BG 4	Providence	1
CT 21.02 BG 5	Providence	3
CT 22 BG 1	Providence	1
CT 22 BG 2	Providence	1
CT 22 BG 3	Providence	1
CT 22 BG 4	Providence	1
CT 23 BG 1	Providence	2
CT 23 BG 4	Providence	2
CT 23 BG 5	Providence	3
CT 23 BG 6	Providence	3
CT 24 BG 1	Providence	2
CT 24 BG 2	Providence	1
CT 24 BG 4	Providence	1
CT 25 BG 1	Providence	1
CT 25 BG 2	Providence	3
CT 26 BG 1	Providence	1

Census Tract & Block Group ID	Place Name	Category
CT 26 BG 2	Providence	1
CT 26 BG 3	Providence	1
CT 27 BG 1	Providence	1
CT 27 BG 2	Providence	1
CT 27 BG 3	Providence	1
CT 27 BG 4	Providence	2
CT 28 BG 1	Providence	1
CT 28 BG 2	Providence	1
CT 28 BG 3	Providence	1
CT 28 BG 4	Providence	1
CT 29 BG 1	Providence	3
CT 29 BG 2	Providence	1
CT 29 BG 3	Providence	1
CT 29 BG 4	Providence	1
CT 29 BG 5	Providence	1
CT 3 BG 1	Providence	1
CT 3 BG 2	Providence	1
CT 3 BG 3	Providence	1
CT 3 BG 4	Providence	1
CT 3 BG 5	Providence	1
CT 3 BG 6	Providence	3
CT 31 BG 2	Providence	1
CT 31 BG 3	Providence	1
CT 31 BG 5	Providence	1
CT 32 BG 1	Providence	2
CT 32 BG 4	Providence	3
CT 33 BG 4	Providence	2
CT 35 BG 2	Providence	2
CT 35 BG 3	Providence	3
CT 36.01 BG 1	Providence	1
CT 36.02 BG 1	Providence	3
CT 36.02 BG 3	Providence	2
CT 37 BG 1	Providence	1
CT 37 BG 2	Providence	1
CT 37 BG 3	Providence	2
CT 37 BG 4	Providence	2
CT 4 BG 1	Providence	1
CT 4 BG 2	Providence	1
CT 4 BG 3	Providence	1
CT 4 BG 4	Providence	1
CT 5 BG 1	Providence	1
CT 5 BG 2	Providence	1
CT 5 BG 3	Providence	1
CT 6 BG 1	Providence	3
CT 6 BG 2	Providence	1
CT 7 BG 1	Providence	1
CT 7 BG 2	Providence	1
CT 7 BG 3	Providence	1
CT 8 BG 1	Providence	3
CT 8 BG 2	Providence	1
CT 8 BG 3	Providence	1
CT 9 BG 1	Providence	1
CT 9 BG 2	Providence	1

Table G-EJ7. Census Tracts (CT) and Block Groups (BG) in Bristol County, Rhode Island (County ID 44-001) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 301 BG 1	Barrington	2
CT 301 BG 2	Barrington	3
CT 301 BG 3	Barrington	3
CT 301 BG 4	Barrington	1
CT 302 BG 2	Barrington	3
CT 303 BG 1	Barrington	3
CT 304 BG 2	Barrington	3
CT 305 BG 1	Warren	1
CT 305 BG 2	Warren	2
CT 305 BG 3	Warren	2
CT 306.01 BG 1	Warren	2
CT 306.02 BG 1	Warren	2
CT 306.02 BG 3	Warren	2
CT 306.02 BG 4	Warren	2
CT 307 BG 1	Bristol	2
CT 307 BG 2	Bristol	2
CT 307 BG 3	Bristol	1
CT 307 BG 4	Bristol	1
CT 308 BG 1	Bristol	1
CT 308 BG 3	Bristol	1
CT 309.01 BG 1	Bristol	1
CT 309.02 BG 1	Bristol	3
CT 309.02 BG 3	Bristol	2
CT 309.02 BG 4	Bristol	1

Table G-EJ8. Census Tracts (CT) and Block Groups (BG) in Kent County, Rhode Island (County ID 44-003) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 201.01 BG 1	West Warwick	1
CT 201.01 BG 3	West Warwick	3
CT 201.02 BG 1	West Warwick	2
CT 201.02 BG 2	West Warwick	1
CT 201.02 BG 3	West Warwick	2
CT 202 BG 1	West Warwick	1
CT 202 BG 2	West Warwick	1
CT 202 BG 3	West Warwick	1
CT 203 BG 1	West Warwick	1
CT 203 BG 2	West Warwick	2
CT 203 BG 3	West Warwick	2
CT 203 BG 4	West Warwick	1
CT 203 BG 5	West Warwick	2
CT 204 BG 3	West Warwick	1
CT 205 BG 1	West Warwick	3
CT 205 BG 2	West Warwick	1
CT 206.01 BG 1	Coventry	2
CT 206.02 BG 1	Coventry	2
CT 206.02 BG 2	Coventry	1
CT 206.03 BG 1	Coventry	2
CT 206.04 BG 1	Coventry	2
CT 206.04 BG 2	Coventry	2
CT 207.03 BG 2	Coventry	2
CT 208 BG 1	West Greenwich	3
CT 208 BG 2	West Greenwich	3
CT 209.01 BG 1	East Greenwich	1
CT 209.01 BG 3	East Greenwich	2
CT 209.03 BG 1	East Greenwich	3
CT 209.03 BG 2	East Greenwich	1
CT 209.03 BG 3	East Greenwich	3
CT 210.01 BG 1	Warwick	1
CT 210.01 BG 2	Warwick	3
CT 210.02 BG 1	Warwick	3
CT 210.02 BG 3	Warwick	3
CT 210.02 BG 4	Warwick	1
CT 211 BG 3	Warwick	1
CT 211 BG 4	Warwick	1
CT 212 BG 2	Warwick	1
CT 212 BG 3	Warwick	1
CT 213 BG 1	Warwick	1
CT 213 BG 3	Warwick	3
CT 213 BG 4	Warwick	3
CT 214.01 BG 1	Warwick	1
CT 214.01 BG 3	Warwick	3
CT 214.02 BG 1	Warwick	2
CT 214.02 BG 2	Warwick	1
CT 214.02 BG 3	Warwick	1
CT 215.01 BG 2	Warwick	2

Census Tract & Block Group ID	Place Name	Category
CT 215.01 BG 3	Warwick	2
CT 215.02 BG 1	Warwick	3
CT 215.02 BG 3	Warwick	3
CT 215.02 BG 4	Warwick	1
CT 216 BG 1	Warwick	3
CT 217 BG 2	Warwick	2
CT 217 BG 3	Warwick	3
CT 217 BG 4	Warwick	1
CT 217 BG 5	Warwick	1
CT 218 BG 1	Warwick	3
CT 219.01 BG 1	Warwick	1
CT 219.01 BG 2	Warwick	3
CT 219.01 BG 3	Warwick	2
CT 219.02 BG 1	Warwick	3

Census Tract & Block Group ID	Place Name	Category
CT 219.02 BG 3	Warwick	3
CT 219.03 BG 3	Warwick	1
CT 220 BG 2	Warwick	2
CT 220 BG 3	Warwick	2
CT 221 BG 1	Warwick	1
CT 221 BG 2	Warwick	3
CT 222.01 BG 1	Warwick	3
CT 222.01 BG 4	Warwick	3
CT 222.01 BG 5	Warwick	2
CT 222.02 BG 2	Warwick	1
CT 222.02 BG 3	Warwick	3
CT 223 BG 2	Warwick	1
CT 223 BG 3	Warwick	1
CT 223 BG 4	Warwick	2

Table G-EJ9. Census Tracts (CT) and Block Groups (BG) in Washington County, Rhode Island (County ID 44-009) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 415 BG 1	New Shoreham	2
CT 501.02 BG 2	North Kingstown	2
CT 501.03 BG 1	North Kingstown	1
CT 501.03 BG 2	North Kingstown	1
CT 501.03 BG 3	North Kingstown	1
CT 501.03 BG 4	North Kingstown	2
CT 501.03 BG 5	North Kingstown	2
CT 503.01 BG 2	North Kingstown	3
CT 503.01 BG 3	North Kingstown	2
CT 503.02 BG 2	North Kingstown	3
CT 503.02 BG 3	North Kingstown	1
CT 504.02 BG 1	North Kingstown	2
CT 505 BG 3	Exeter	3
CT 506 BG 1	Richmond	3
CT 506 BG 3	Richmond	3
CT 507 BG 1	Hopkinton	2
CT 507 BG 3	Hopkinton	2
CT 507 BG 4	Hopkinton	2
CT 507 BG 6	Hopkinton	3
CT 508.01 BG 1	Westerly	1
CT 508.01 BG 2	Westerly	1
CT 508.01 BG 3	Westerly	1
CT 508.01 BG 4	Westerly	2
CT 508.01 BG 5	Westerly	1
CT 508.02 BG 1	Westerly	1
CT 508.02 BG 2	Westerly	3

Census Tract & Block Group ID	Place Name	Category
CT 509.01 BG 2	Westerly	1
CT 509.02 BG 1	Westerly	2
CT 509.02 BG 2	Westerly	2
CT 510 BG 4	Westerly	2
CT 510 BG 5	Westerly	2
CT 511.01 BG 2	Charlestown	2
CT 511.02 BG 1	Charlestown	2
CT 512.01 BG 1	South Kingstown	1
CT 512.01 BG 2	South Kingstown	1
CT 512.02 BG 2	South Kingstown	1
CT 512.02 BG 3	South Kingstown	1
CT 512.02 BG 4	South Kingstown	2
CT 513.02 BG 5	South Kingstown	2
CT 513.02 BG 6	South Kingstown	2
CT 513.05 BG 2	South Kingstown	2
CT 513.06 BG 1	South Kingstown	3
CT 513.06 BG 3	South Kingstown	1
CT 514 BG 1	South Kingstown	1
CT 515.02 BG 2	Narragansett	2
CT 515.03 BG 2	Narragansett	1
CT 515.03 BG 3	Narragansett	2
CT 515.04 BG 1	Narragansett	2
CT 515.04 BG 2	Narragansett	2
CT 515.04 BG 3	Narragansett	2
CT 515.04 BG 4	Narragansett	1

Table G-EJ10. Census Tracts (CT) and Block Groups (BG) in Newport County, Rhode Island (County ID 44-005) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 401.01 BG 1	Portsmouth	1
CT 401.03 BG 3	Portsmouth	2
CT 401.03 BG 4	Portsmouth	3
CT 402 BG 1	Middletown	1
CT 403.02 BG 1	Middletown	3
CT 403.02 BG 2	Middletown	1
CT 403.03 BG 1	Middletown	3
CT 403.03 BG 2	Middletown	1
CT 403.04 BG 1	Middletown	3
CT 403.04 BG 2	Middletown	2
CT 404 BG 2	Middletown	2
CT 404 BG 3	Middletown	2
CT 405 BG 1	Newport	1
CT 405 BG 2	Newport	1
CT 405 BG 3	Newport	1
CT 406 BG 1	Newport	3
CT 406 BG 2	Newport	1
CT 406 BG 3	Newport	2
CT 406 BG 4	Newport	1
CT 407 BG 2	Newport	1
CT 408 BG 1	Newport	1
CT 409 BG 1	Un-named area	2
CT 409 BG 3	Newport	2
CT 410 BG 1	Newport	1
CT 410 BG 2	Newport	2
CT 411 BG 1	Newport	1
CT 411 BG 2	Newport	2
CT 411 BG 3	Newport	2
CT 412 BG 1	Newport	1
CT 413 BG 1	Jamestown	3
CT 413 BG 2	Jamestown	3
CT 416.01 BG 1	Tiverton	2
CT 416.01 BG 2	Tiverton	2

Table G-EJ11. Census Tracts (CT) and Block Groups (BG) in New London County, Connecticut (County ID 09-011) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 6601.02 BG 1	Old Lyme	2
CT 6601.02 BG 4	Old Lyme	3
CT 6903 BG 1	New London	3
CT 6903 BG 2	New London	1
CT 6903 BG 3	New London	1
CT 6903 BG 4	New London	1
CT 6904 BG 1	New London	1
CT 6904 BG 2	New London	1
CT 6905 BG 1	New London	1
CT 6905 BG 2	New London	1
CT 6907 BG 1	New London	1
CT 6908 BG 1	New London	1
CT 6908 BG 2	New London	1
CT 6908 BG 3	New London	1
CT 6909 BG 4	New London	3
CT 6934 BG 1	Waterford	1
CT 6934 BG 2	Waterford	2
CT 6934 BG 3	Waterford	2
CT 6952.01 BG 1	Montville	1
CT 6952.01 BG 2	Montville	2
CT 6961 BG 1	Norwich	2
CT 6961 BG 2	Norwich	1
CT 6961 BG 3	Norwich	1
CT 6961 BG 4	Norwich	3
CT 6962 BG 2	Norwich	3
CT 6963 BG 2	Norwich	2
CT 6964 BG 1	Norwich	1
CT 6964 BG 2	Norwich	1
CT 6964 BG 3	Norwich	1
CT 6964 BG 4	Norwich	1
CT 6964 BG 5	Norwich	1
CT 6965 BG 1	Norwich	3
CT 6965 BG 2	Norwich	1
CT 6965 BG 3	Norwich	1
CT 6966 BG 1	Norwich	3
CT 6966 BG 2	Norwich	3
CT 6967 BG 1	Norwich	1
CT 6967 BG 2	Norwich	1
CT 6967 BG 3	Norwich	1
CT 6968 BG 1	Norwich	1

Census Tract & Block Group ID	Place Name	Category
CT 6968 BG 2	Norwich	1
CT 6970 BG 1	Norwich	1
CT 6970 BG 2	Norwich	1
CT 7001 BG 3	Preston	2
CT 7011 BG 1	Ledyard	3
CT 7011 BG 2	Ledyard	2
CT 7011 BG 3	Ledyard	1
CT 7012 BG 2	Ledyard	2
CT 7021 BG 1	Groton	2
CT 7023 BG 2	Groton	3
CT 7024 BG 1	Groton	3
CT 7024 BG 2	Groton	3
CT 7024 BG 3	Groton	1
CT 7025 BG 1	Groton	1
CT 7025 BG 2	Groton	1
CT 7027 BG 1	Groton	1
CT 7027 BG 2	Groton	3
CT 7027 BG 3	Groton	2
CT 7028 BG 1	Groton	1
CT 7051.02 BG 2	Stonington	2
CT 7051.02 BG 3	Stonington	2
CT 7051.02 BG 4	Stonington	2
CT 7071 BG 1	North Stonington	3
CT 7071 BG 3	North Stonington	2
CT 7081 BG 2	Voluntown	2
CT 7091 BG 2	Griswold	2
CT 7092 BG 1	Griswold	2
CT 7092 BG 2	Griswold	2
CT 7092 BG 3	Griswold	1
CT 7092 BG 4	Griswold	2
CT 7092 BG 5	Griswold	2
CT 7111 BG 2	Sprague	2
CT 7141.01 BG 3	Colchester	2
CT 7141.03 BG 3	Colchester	2
CT 7161.01 BG 1	East Lyme	1
CT 7161.01 BG 3	East Lyme	3
CT 8701 BG 5	Lebanon	2
CT 8702 BG 1	Groton	2
CT 8702 BG 3	Groton	3
CT 8702 BG 4	Groton	1
CT 8703 BG 1	New London	1
CT 8703 BG 2	New London	1
CT 8703 BG 3	New London	2
CT 8703 BG 4	New London	1
CT 8705.01 BG 1	Montville	3
CT 8705.01 BG 2	Montville	3
CT 8705.01 BG 3	Montville	3
CT 8705.02 BG 1	Montville	3
CT 8705.02 BG 2	Montville	2
CT 8707.04 BG 2	East Lyme	2
CT 9800 BG 1	Groton	3

Table G-EJ12. Census Tracts (CT) and Block Groups (BG) in Suffolk County, New York (County ID 36-103) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 1102 BG 2	Huntington	2
CT 1102 BG 5	Huntington	2
CT 1103 BG 3	Huntington	2
CT 1106 BG 3	Huntington	2
CT 1108.03 BG 2	Huntington	2
CT 1109.02 BG 1	Huntington	3
CT 1109.02 BG 2	Huntington	1
CT 1110.01 BG 2	Huntington	2
CT 1110.02 BG 1	Huntington	1
CT 1110.02 BG 3	Huntington	1
CT 1110.02 BG 4	Huntington	1
CT 1111 BG 1	Huntington	1
CT 1111 BG 2	Huntington	3
CT 1111 BG 3	Huntington	1
CT 1111 BG 4	Huntington	1
CT 1111 BG 5	Huntington	2
CT 1112.01 BG 1	Huntington	1
CT 1112.01 BG 2	Huntington	1
CT 1112.02 BG 1	Huntington	1
CT 1112.02 BG 2	Huntington	1
CT 1112.02 BG 3	Huntington	3
CT 1114.02 BG 1	Huntington	2
CT 1115.03 BG 2	Huntington	1
CT 1115.03 BG 3	Huntington	2
CT 1115.05 BG 2	Huntington	1
CT 1115.05 BG 3	Huntington	1
CT 1115.05 BG 4	Huntington	3
CT 1115.06 BG 1	Huntington	3
CT 1115.06 BG 2	Huntington	1
CT 1117.01 BG 1	Huntington	2
CT 1117.01 BG 2	Huntington	2
CT 1117.01 BG 3	Huntington	2

Census Tract & Block Group ID	Place Name	Category
CT 1117.01 BG 4	Huntington	2
CT 1117.04 BG 1	Huntington	2
CT 1118.01 BG 1	Huntington	3
CT 1118.01 BG 4	Huntington	3
CT 1120.01 BG 1	Huntington	2
CT 1120.02 BG 3	Huntington	2
CT 1121.03 BG 2	Huntington	2
CT 1121.03 BG 3	Huntington	2
CT 1121.04 BG 1	Huntington	3
CT 1122.04 BG 3	Huntington	2
CT 1122.1 BG 2	Huntington	1
CT 1122.1 BG 3	Huntington	3
CT 1122.12 BG 1	Huntington	3
CT 1122.13 BG 1	Huntington	3
CT 1122.13 BG 2	Huntington	3
CT 1122.13 BG 3	Huntington	3
CT 1122.14 BG 1	Huntington	1
CT 1122.14 BG 4	Huntington	3
CT 1223 BG 1	Babylon	3
CT 1223 BG 2	Babylon	2
CT 1224.03 BG 1	Babylon	3
CT 1224.03 BG 2	Babylon	3
CT 1224.04 BG 1	Babylon	3
CT 1224.05 BG 1	Babylon	3
CT 1224.05 BG 2	Babylon	3
CT 1224.06 BG 1	Babylon	1
CT 1224.06 BG 2	Babylon	1
CT 1224.06 BG 3	Babylon	1
CT 1225.01 BG 1	Babylon	1
CT 1225.01 BG 2	Babylon	1
CT 1225.01 BG 3	Babylon	1
CT 1225.02 BG 1	Babylon	3
CT 1225.02 BG 2	Babylon	3
CT 1225.02 BG 3	Babylon	3
CT 1226.01 BG 1	Babylon	3
CT 1226.01 BG 3	Babylon	3
CT 1226.02 BG 1	Babylon	1
CT 1226.02 BG 2	Babylon	2
CT 1226.03 BG 1	Babylon	3
CT 1226.03 BG 3	Babylon	2
CT 1226.03 BG 4	Babylon	3
CT 1227.04 BG 1	Babylon	1
CT 1227.04 BG 2	Babylon	3
CT 1227.05 BG 1	Babylon	1
CT 1227.05 BG 2	Babylon	3
CT 1227.06 BG 1	Babylon	2
CT 1227.06 BG 2	Babylon	1
CT 1227.07 BG 1	Babylon	2
CT 1228.01 BG 1	Babylon	1
CT 1228.01 BG 2	Babylon	1
CT 1228.01 BG 4	Babylon	3

Census Tract & Block Group ID	Place Name	Category
CT 1228.02 BG 1	Babylon	3
CT 1228.02 BG 2	Babylon	3
CT 1229.01 BG 2	Babylon	2
CT 1229.01 BG 4	Babylon	3
CT 1229.02 BG 3	Babylon	2
CT 1230.01 BG 2	Babylon	3
CT 1230.01 BG 3	Babylon	2
CT 1230.01 BG 4	Babylon	3
CT 1230.02 BG 2	Babylon	1
CT 1230.02 BG 3	Babylon	1
CT 1231.01 BG 1	Babylon	2
CT 1231.01 BG 2	Babylon	2
CT 1231.02 BG 3	Babylon	3
CT 1232.01 BG 1	Babylon	1
CT 1232.02 BG 1	Babylon	3
CT 1232.02 BG 2	Babylon	1
CT 1232.02 BG 3	Babylon	1
CT 1232.02 BG 4	Babylon	3
CT 1233.01 BG 1	Babylon	1
CT 1233.01 BG 2	Babylon	1
CT 1233.01 BG 3	Babylon	1
CT 1233.01 BG 4	Babylon	1
CT 1233.01 BG 5	Babylon	3
CT 1233.01 BG 6	Babylon	1
CT 1233.02 BG 1	Babylon	1
CT 1234.01 BG 1	Babylon	3
CT 1234.01 BG 2	Babylon	2
CT 1234.01 BG 3	Babylon	2
CT 1234.02 BG 1	Babylon	2
CT 1234.02 BG 2	Babylon	3
CT 1234.02 BG 3	Babylon	2
CT 1234.02 BG 5	Babylon	2
CT 1235 BG 1	Babylon	1
CT 1235 BG 2	Babylon	1
CT 1235 BG 3	Babylon	2
CT 1235 BG 4	Babylon	1
CT 1237.01 BG 1	Babylon	1
CT 1237.01 BG 2	Babylon	1
CT 1237.01 BG 3	Babylon	1
CT 1237.01 BG 4	Babylon	1
CT 1237.02 BG 1	Babylon	1
CT 1237.02 BG 2	Babylon	1
CT 1237.02 BG 3	Babylon	1
CT 1238.01 BG 1	Babylon	2
CT 1238.02 BG 1	Babylon	2
CT 1238.02 BG 2	Babylon	1
CT 1239 BG 1	Babylon	2
CT 1239 BG 2	Babylon	3
CT 1239 BG 3	Babylon	2
CT 1239 BG 5	Babylon	1
CT 1240.01 BG 2	Babylon	2

Census Tract & Block Group ID	Place Name	Category
CT 1240.02 BG 1	Babylon	3
CT 1241.01 BG 1	Babylon	2
CT 1241.01 BG 2	Babylon	1
CT 1241.02 BG 1	Babylon	2
CT 1242 BG 1	Babylon	2
CT 1242 BG 3	Babylon	2
CT 1242 BG 4	Babylon	2
CT 1243 BG 2	Babylon	1
CT 1243 BG 3	Babylon	2
CT 1243 BG 5	Babylon	2
CT 1244.01 BG 1	Babylon	2
CT 1245 BG 3	Babylon	3
CT 1246.01 BG 3	Babylon	2
CT 1246.02 BG 3	Babylon	2
CT 1246.02 BG 4	Babylon	2
CT 1347.02 BG 3	Smithtown	2
CT 1347.02 BG 4	Smithtown	2
CT 1347.03 BG 2	Smithtown	2
CT 1347.04 BG 2	Smithtown	2
CT 1349.02 BG 2	Smithtown	2
CT 1349.04 BG 4	Smithtown	2
CT 1349.06 BG 1	Smithtown	2
CT 1349.06 BG 4	Smithtown	2
CT 1350.03 BG 3	Smithtown	2
CT 1350.05 BG 2	Smithtown	2
CT 1353.01 BG 3	Smithtown	2
CT 1354.02 BG 3	Smithtown	3
CT 1354.03 BG 1	Smithtown	2
CT 1354.03 BG 3	Smithtown	3
CT 1456.02 BG 1	Islip	1
CT 1456.02 BG 2	Islip	1
CT 1456.02 BG 3	Islip	1
CT 1456.03 BG 1	Islip	1
CT 1456.03 BG 2	Islip	1
CT 1456.03 BG 3	Islip	1
CT 1456.04 BG 1	Islip	1
CT 1456.04 BG 2	Islip	1
CT 1456.05 BG 1	Islip	1
CT 1456.05 BG 2	Islip	1
CT 1457.01 BG 1	Islip	2
CT 1457.01 BG 2	Islip	2
CT 1457.01 BG 3	Islip	1
CT 1457.01 BG 4	Islip	2
CT 1457.02 BG 1	Islip	1
CT 1457.02 BG 2	Islip	1
CT 1457.02 BG 3	Islip	1
CT 1457.03 BG 1	Islip	3
CT 1457.03 BG 2	Islip	1
CT 1457.03 BG 3	Islip	1
CT 1457.04 BG 1	Islip	3
CT 1457.04 BG 2	Islip	1
CT 1457.04 BG 3	Islip	1
CT 1457.04 BG 4	Islip	3
CT 1458.03 BG 1	Islip	1
CT 1458.03 BG 2	Islip	2
CT 1458.03 BG 3	Islip	2
CT 1458.04 BG 1	Islip	3
CT 1458.04 BG 2	Islip	1
CT 1458.05 BG 1	Islip	2
CT 1458.05 BG 2	Islip	1
CT 1458.08 BG 2	Islip	2
CT 1459.01 BG 1	Islip	1
CT 1459.01 BG 2	Islip	1
CT 1459.02 BG 1	Islip	1
CT 1459.02 BG 2	Islip	3
CT 1459.02 BG 3	Islip	1
CT 1459.02 BG 4	Islip	1
CT 1459.03 BG 1	Islip	1
CT 1459.03 BG 2	Islip	2
CT 1459.03 BG 3	Islip	3
CT 1459.03 BG 4	Islip	1
CT 1460.01 BG 1	Islip	1
CT 1460.01 BG 2	Islip	1
CT 1460.02 BG 1	Islip	1
CT 1460.02 BG 2	Islip	1
CT 1460.02 BG 3	Islip	1
CT 1460.03 BG 1	Islip	3
CT 1460.03 BG 2	Islip	3
CT 1460.03 BG 3	Islip	1
CT 1460.03 BG 4	Islip	1
CT 1461.02 BG 1	Islip	1
CT 1461.03 BG 2	Islip	1
CT 1461.05 BG 1	Islip	1
CT 1461.05 BG 2	Islip	1
CT 1461.05 BG 3	Islip	1
CT 1461.06 BG 1	Islip	1
CT 1461.06 BG 2	Islip	1
CT 1462.01 BG 1	Islip	1
CT 1462.01 BG 2	Islip	1
CT 1462.02 BG 1	Islip	1
CT 1462.02 BG 2	Islip	1
CT 1462.03 BG 1	Islip	1
CT 1462.03 BG 2	Islip	1
CT 1462.03 BG 3	Islip	1
CT 1462.04 BG 1	Islip	1
CT 1462.04 BG 2	Islip	1
CT 1462.04 BG 3	Islip	1
CT 1462.06 BG 1	Islip	1
CT 1463 BG 1	Islip	1
CT 1463 BG 2	Islip	1
CT 1464.03 BG 1	Islip	1
CT 1464.03 BG 2	Islip	1

Census Tract & Block Group ID	Place Name	Category
CT 1464.03 BG 3	Islip	1
CT 1464.04 BG 1	Islip	1
CT 1464.04 BG 2	Islip	1
CT 1466.04 BG 1	Islip	1
CT 1466.04 BG 2	Islip	2
CT 1466.04 BG 3	Islip	3
CT 1466.06 BG 2	Islip	2
CT 1466.07 BG 1	Islip	2
CT 1466.08 BG 1	Islip	1
CT 1466.13 BG 1	Islip	2
CT 1466.15 BG 3	Islip	3
CT 1467.03 BG 1	Islip	1
CT 1467.03 BG 2	Islip	3
CT 1467.04 BG 1	Islip	2
CT 1468 BG 1	Islip	2
CT 1468 BG 4	Islip	2
CT 1469.01 BG 3	Islip	2
CT 1469.01 BG 4	Islip	2
CT 1469.02 BG 2	Islip	2
CT 1472 BG 1	Islip	1
CT 1472 BG 2	Islip	1
CT 1472 BG 4	Islip	1
CT 1472 BG 5	Islip	1
CT 1473 BG 1	Islip	1
CT 1473 BG 2	Islip	3
CT 1473 BG 3	Islip	3
CT 1473 BG 4	Islip	3
CT 1473 BG 5	Islip	1
CT 1474.01 BG 4	Islip	1
CT 1475.01 BG 2	Islip	2
CT 1475.01 BG 5	Islip	2
CT 1476.02 BG 3	Islip	2
CT 1477.01 BG 2	Islip	2
CT 1477.02 BG 4	Islip	2
CT 1478.02 BG 1	Islip	2
CT 1479.01 BG 2	Islip	2
CT 1479.01 BG 3	Islip	2
CT 1479.02 BG 1	Islip	2
CT 1580.02 BG 3	Brookhaven	2
CT 1580.02 BG 4	Brookhaven	2
CT 1580.07 BG 1	Brookhaven	3
CT 1580.07 BG 2	Brookhaven	1
CT 1580.07 BG 3	Brookhaven	3
CT 1580.07 BG 4	Brookhaven	3
CT 1580.11 BG 3	Brookhaven	2
CT 1581.02 BG 2	Brookhaven	3
CT 1581.03 BG 1	Brookhaven	1
CT 1581.03 BG 2	Brookhaven	2
CT 1581.07 BG 1	Brookhaven	2
CT 1581.08 BG 1	Brookhaven	3
CT 1581.11 BG 2	Brookhaven	1

Census Tract & Block Group ID	Place Name	Category
CT 1581.12 BG 1	Brookhaven	3
CT 1581.12 BG 2	Brookhaven	2
CT 1581.15 BG 3	Brookhaven	2
CT 1581.16 BG 1	Brookhaven	3
CT 1581.16 BG 2	Brookhaven	3
CT 1582.02 BG 2	Brookhaven	1
CT 1582.02 BG 5	Brookhaven	2
CT 1582.06 BG 2	Brookhaven	2
CT 1583.04 BG 2	Brookhaven	1
CT 1583.06 BG 2	Brookhaven	2
CT 1583.08 BG 1	Brookhaven	2
CT 1583.08 BG 2	Brookhaven	1
CT 1583.08 BG 4	Brookhaven	1
CT 1583.09 BG 1	Brookhaven	1
CT 1583.09 BG 2	Brookhaven	1
CT 1583.1 BG 1	Brookhaven	2
CT 1583.1 BG 2	Brookhaven	2
CT 1583.15 BG 1	Brookhaven	3
CT 1583.15 BG 2	Brookhaven	2
CT 1583.19 BG 2	Brookhaven	1
CT 1583.19 BG 3	Brookhaven	3
CT 1583.2 BG 4	Brookhaven	3
CT 1583.21 BG 1	Brookhaven	1
CT 1583.21 BG 3	Brookhaven	3
CT 1583.21 BG 4	Brookhaven	3
CT 1583.23 BG 2	Brookhaven	2
CT 1584.01 BG 1	Brookhaven	2
CT 1584.02 BG 2	Brookhaven	2
CT 1584.03 BG 1	Brookhaven	2
CT 1584.03 BG 2	Brookhaven	2
CT 1584.05 BG 2	Brookhaven	2
CT 1584.07 BG 2	Brookhaven	2
CT 1584.07 BG 4	Brookhaven	1
CT 1584.09 BG 1	Brookhaven	1
CT 1584.09 BG 2	Brookhaven	2
CT 1584.1 BG 2	Brookhaven	2
CT 1584.1 BG 3	Brookhaven	2
CT 1585.02 BG 2	Brookhaven	2
CT 1585.02 BG 3	Brookhaven	2
CT 1585.05 BG 3	Brookhaven	1
CT 1585.07 BG 1	Brookhaven	3
CT 1585.07 BG 2	Brookhaven	2
CT 1585.08 BG 1	Brookhaven	3
CT 1585.09 BG 1	Brookhaven	2
CT 1585.09 BG 2	Brookhaven	3
CT 1585.09 BG 3	Brookhaven	2
CT 1585.1 BG 2	Brookhaven	2
CT 1585.1 BG 3	Brookhaven	2
CT 1585.1 BG 4	Brookhaven	2
CT 1585.11 BG 3	Brookhaven	1
CT 1586.04 BG 1	Brookhaven	2

Census Tract & Block Group ID	Place Name	Category
CT 1586.04 BG 2	Brookhaven	1
CT 1586.05 BG 2	Brookhaven	3
CT 1586.07 BG 1	Brookhaven	3
CT 1586.07 BG 2	Brookhaven	2
CT 1586.08 BG 1	Brookhaven	2
CT 1586.08 BG 2	Brookhaven	3
CT 1586.08 BG 3	Brookhaven	2
CT 1586.09 BG 3	Brookhaven	3
CT 1587.04 BG 1	Brookhaven	2
CT 1587.04 BG 2	Brookhaven	2
CT 1587.04 BG 3	Brookhaven	2
CT 1587.04 BG 4	Brookhaven	1
CT 1587.05 BG 1	Brookhaven	1
CT 1587.05 BG 2	Brookhaven	1
CT 1587.05 BG 3	Brookhaven	1
CT 1587.08 BG 1	Brookhaven	2
CT 1587.08 BG 2	Brookhaven	1
CT 1587.08 BG 3	Brookhaven	1
CT 1587.1 BG 1	Brookhaven	1
CT 1587.1 BG 3	Brookhaven	2
CT 1587.1 BG 4	Brookhaven	3
CT 1587.11 BG 2	Brookhaven	2
CT 1587.11 BG 3	Brookhaven	1
CT 1587.12 BG 1	Brookhaven	3
CT 1587.12 BG 2	Brookhaven	1
CT 1587.12 BG 5	Brookhaven	2
CT 1588.02 BG 3	Brookhaven	2
CT 1588.03 BG 3	Brookhaven	3
CT 1588.04 BG 1	Brookhaven	1
CT 1588.04 BG 2	Brookhaven	3
CT 1588.04 BG 3	Brookhaven	2
CT 1588.04 BG 4	Brookhaven	2
CT 1588.04 BG 5	Brookhaven	2
CT 1589 BG 1	Brookhaven	2
CT 1589 BG 2	Brookhaven	1
CT 1589 BG 4	Brookhaven	1
CT 1589 BG 5	Brookhaven	1
CT 1590 BG 1	Brookhaven	1
CT 1590 BG 2	Brookhaven	1
CT 1590 BG 3	Brookhaven	2
CT 1591.02 BG 1	Brookhaven	1
CT 1591.02 BG 3	Brookhaven	1
CT 1591.02 BG 4	Brookhaven	1
CT 1591.02 BG 5	Brookhaven	2
CT 1591.03 BG 1	Brookhaven	1
CT 1591.03 BG 2	Brookhaven	1
CT 1591.03 BG 3	Brookhaven	1
CT 1591.03 BG 4	Brookhaven	1
CT 1591.05 BG 2	Brookhaven	1
CT 1591.05 BG 3	Brookhaven	1
CT 1591.05 BG 4	Brookhaven	2

Census Tract & Block Group ID	Place Name	Category
CT 1591.06 BG 1	Brookhaven	1
CT 1591.06 BG 2	Brookhaven	1
CT 1591.06 BG 3	Brookhaven	3
CT 1591.07 BG 1	Brookhaven	2
CT 1591.07 BG 3	Brookhaven	2
CT 1591.08 BG 1	Brookhaven	3
CT 1591.08 BG 2	Brookhaven	3
CT 1591.08 BG 3	Brookhaven	2
CT 1591.08 BG 5	Brookhaven	3
CT 1592.01 BG 1	Brookhaven	2
CT 1592.01 BG 2	Brookhaven	2
CT 1592.03 BG 3	Brookhaven	2
CT 1592.04 BG 1	Brookhaven	1
CT 1592.04 BG 3	Brookhaven	2
CT 1594.04 BG 1	Brookhaven	1
CT 1594.04 BG 2	Brookhaven	2
CT 1594.04 BG 3	Brookhaven	1
CT 1594.04 BG 4	Brookhaven	1
CT 1594.04 BG 5	Brookhaven	1
CT 1594.06 BG 3	Brookhaven	1
CT 1594.07 BG 2	Brookhaven	2
CT 1594.08 BG 1	Brookhaven	1
CT 1594.1 BG 1	Brookhaven	2
CT 1594.1 BG 2	Brookhaven	1
CT 1594.11 BG 2	Brookhaven	2
CT 1594.12 BG 2	Brookhaven	2
CT 1594.12 BG 4	Brookhaven	2
CT 1595.05 BG 1	Brookhaven	2
CT 1595.05 BG 2	Brookhaven	1
CT 1595.05 BG 3	Brookhaven	2
CT 1595.05 BG 4	Brookhaven	2
CT 1595.05 BG 5	Brookhaven	3
CT 1595.06 BG 1	Brookhaven	1
CT 1595.06 BG 2	Brookhaven	1
CT 1595.06 BG 3	Brookhaven	1
CT 1595.06 BG 4	Brookhaven	1
CT 1595.08 BG 1	Brookhaven	2
CT 1595.08 BG 3	Brookhaven	2
CT 1595.08 BG 4	Brookhaven	1
CT 1595.09 BG 1	Brookhaven	2
CT 1595.09 BG 2	Brookhaven	2
CT 1595.09 BG 3	Brookhaven	1
CT 1595.1 BG 1	Brookhaven	1
CT 1595.1 BG 2	Brookhaven	2
CT 1595.11 BG 1	Brookhaven	1
CT 1595.11 BG 2	Brookhaven	1
CT 1595.11 BG 3	Brookhaven	1
CT 1595.12 BG 1	Brookhaven	2
CT 1596.01 BG 4	Brookhaven	2
CT 1596.02 BG 2	Brookhaven	2
CT 1697.01 BG 3	Riverhead	2

Census Tract & Block Group ID	Place Name	Category
CT 1697.04 BG 1	Riverhead	2
CT 1697.04 BG 2	Riverhead	3
CT 1697.04 BG 3	Riverhead	1
CT 1697.04 BG 4	Riverhead	2
CT 1697.04 BG 5	Riverhead	2
CT 1697.04 BG 6	Riverhead	2
CT 1698 BG 1	Riverhead	1
CT 1698 BG 2	Riverhead	1
CT 1698 BG 3	Riverhead	1
CT 1698 BG 4	Riverhead	1
CT 1699.01 BG 1	Riverhead	2
CT 1699.01 BG 2	Riverhead	1
CT 1699.02 BG 3	Riverhead	2
CT 1700.02 BG 4	Southold	2
CT 1701.01 BG 1	Southold	1
CT 1701.01 BG 2	Southold	2
CT 1702.01 BG 2	Southold	2
CT 1702.01 BG 3	Southold	1
CT 1702.02 BG 5	Southold	2
CT 1904.01 BG 1	Southampton	3
CT 1904.01 BG 2	Southampton	1
CT 1904.01 BG 3	Southampton	2
CT 1904.01 BG 4	Southampton	1
CT 1904.01 BG 5	Southampton	2
CT 1904.01 BG 6	Southampton	1
CT 1904.01 BG 7	Southampton	1
CT 1904.02 BG 1	Southampton	1
CT 1904.03 BG 2	Southampton	1
CT 1904.03 BG 3	Southampton	1
CT 1905.02 BG 1	Southampton	1
CT 1905.02 BG 3	Southampton	2
CT 1905.03 BG 2	Southampton	2
CT 1905.03 BG 4	Southampton	2
CT 1906.01 BG 2	Southampton	2
CT 1906.01 BG 4	Southampton	1

Census Tract & Block Group ID	Place Name	Category
CT 1906.03 BG 1	Southampton	1
CT 1906.03 BG 2	Southampton	1
CT 1906.03 BG 3	Southampton	1
CT 1906.04 BG 2	Southampton	2
CT 1907.04 BG 1	Southampton	1
CT 1907.04 BG 3	Southampton	2
CT 1907.04 BG 4	Southampton	1
CT 1907.04 BG 5	Southampton	2
CT 1907.05 BG 1	Shinnecock Reservation	1
CT 1907.05 BG 2	Southampton	1
CT 1907.05 BG 3	Southampton	1
CT 1907.05 BG 4	Southampton	1
CT 1907.06 BG 1	Southampton	2
CT 1907.06 BG 5	Southampton	1
CT 1907.07 BG 2	Southampton	2
CT 1907.07 BG 4	Southampton	3
CT 1908 BG 2	Southampton	1
CT 2009.01 BG 2	East Hampton	2
CT 2009.02 BG 2	East Hampton	1
CT 2009.02 BG 3	East Hampton	3
CT 2009.02 BG 4	East Hampton	2
CT 2009.02 BG 7	East Hampton	2
CT 2010.01 BG 2	East Hampton	2
CT 2010.01 BG 4	East Hampton	1
CT 2010.01 BG 5	East Hampton	1
CT 2010.03 BG 1	East Hampton	1
CT 2010.03 BG 4	East Hampton	2
CT 2010.03 BG 5	East Hampton	3
CT 2010.04 BG 2	East Hampton	3
CT 2010.04 BG 4	East Hampton	3
CT 2011 BG 1	Islip	1
CT 2011 BG 2	Islip	1
CT 2011 BG 3	Islip	1
CT 2011 BG 4	Islip	1

Table G-EJ13. Census Tracts (CT) and Block Groups (BG) in New York County, New York (County ID 36-061) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 10.02 BG 1	Manhattan	1
CT 10.02 BG 2	Manhattan	1
CT 10.02 BG 3	Manhattan	1
CT 101 BG 1	Manhattan	3
CT 110 BG 6	Manhattan	2
CT 111 BG 1	Manhattan	3
CT 111 BG 2	Manhattan	2

Census Tract & Block Group ID	Place Name	Category
CT 113 BG 1	Manhattan	1
CT 115 BG 1	Manhattan	3
CT 115 BG 2	Manhattan	1
CT 117 BG 1	Manhattan	3
CT 118 BG 5	Manhattan	2
CT 119 BG 1	Manhattan	1
CT 119 BG 2	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 12 BG 1	Manhattan	1
CT 12 BG 2	Manhattan	2
CT 121 BG 2	Manhattan	2
CT 121 BG 6	Manhattan	1
CT 124 BG 6	Manhattan	1
CT 125 BG 2	Manhattan	3
CT 127 BG 1	Manhattan	2
CT 127 BG 2	Manhattan	3
CT 127 BG 3	Manhattan	1
CT 129 BG 1	Manhattan	2
CT 131 BG 1	Manhattan	1
CT 132 BG 3	Manhattan	3
CT 132 BG 5	Manhattan	3
CT 132 BG 7	Manhattan	3
CT 133 BG 1	Manhattan	2
CT 133 BG 2	Manhattan	1
CT 133 BG 4	Manhattan	3
CT 133 BG 5	Manhattan	3
CT 134 BG 3	Manhattan	2
CT 134 BG 9	Manhattan	1
CT 135 BG 1	Manhattan	1
CT 135 BG 2	Manhattan	1
CT 137 BG 2	Manhattan	2
CT 137 BG 5	Manhattan	3
CT 139 BG 2	Manhattan	3
CT 139 BG 3	Manhattan	1
CT 139 BG 5	Manhattan	1
CT 14.02 BG 1	Manhattan	1
CT 14.02 BG 2	Manhattan	1
CT 143 BG 1	Manhattan	1
CT 145 BG 2	Manhattan	3
CT 146.02 BG 4	Manhattan	2
CT 149 BG 4	Manhattan	2
CT 15.01 BG 3	Manhattan	2
CT 151 BG 1	Manhattan	1
CT 151 BG 2	Manhattan	1
CT 151 BG 3	Manhattan	1
CT 152 BG 1	Manhattan	1
CT 152 BG 2	Manhattan	1
CT 152 BG 3	Manhattan	3
CT 154 BG 9	Manhattan	3
CT 156.01 BG 2	Manhattan	1
CT 156.02 BG 1	Manhattan	1
CT 16 BG 1	Manhattan	1
CT 16 BG 2	Manhattan	1
CT 16 BG 3	Manhattan	1
CT 16 BG 4	Manhattan	1
CT 16 BG 5	Manhattan	1
CT 162 BG 1	Manhattan	1
CT 162 BG 2	Manhattan	1
CT 162 BG 3	Manhattan	1
CT 162 BG 4	Manhattan	1
CT 162 BG 5	Manhattan	1
CT 164 BG 1	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 164 BG 2	Manhattan	1
CT 164 BG 3	Manhattan	1
CT 164 BG 4	Manhattan	1
CT 166 BG 1	Manhattan	1
CT 166 BG 2	Manhattan	1
CT 166 BG 3	Manhattan	1
CT 166 BG 4	Manhattan	1
CT 166 BG 5	Manhattan	1
CT 166 BG 6	Manhattan	1
CT 168 BG 1	Manhattan	1
CT 168 BG 2	Manhattan	1
CT 168 BG 3	Manhattan	1
CT 169 BG 4	Manhattan	2
CT 170 BG 1	Manhattan	1
CT 170 BG 2	Manhattan	1
CT 170 BG 3	Manhattan	1
CT 170 BG 4	Manhattan	3
CT 170 BG 5	Manhattan	1
CT 172 BG 1	Manhattan	1
CT 172 BG 2	Manhattan	1
CT 172 BG 3	Manhattan	1
CT 172 BG 4	Manhattan	1
CT 172 BG 5	Manhattan	1
CT 173 BG 2	Manhattan	1
CT 173 BG 4	Manhattan	3
CT 174.01 BG 1	Manhattan	1
CT 174.01 BG 2	Manhattan	1
CT 174.01 BG 3	Manhattan	3
CT 174.02 BG 1	Manhattan	1
CT 175 BG 3	Manhattan	2
CT 177 BG 1	Manhattan	1
CT 177 BG 2	Manhattan	3
CT 177 BG 4	Manhattan	1
CT 177 BG 7	Manhattan	1
CT 178 BG 1	Manhattan	1
CT 178 BG 2	Manhattan	1
CT 178 BG 3	Manhattan	1
CT 179 BG 6	Manhattan	1
CT 18 BG 1	Manhattan	1
CT 18 BG 2	Manhattan	1
CT 18 BG 3	Manhattan	3
CT 18 BG 4	Manhattan	1
CT 18 BG 5	Manhattan	1
CT 18 BG 6	Manhattan	1
CT 18 BG 7	Manhattan	1
CT 180 BG 1	Manhattan	1
CT 180 BG 2	Manhattan	1
CT 180 BG 3	Manhattan	1
CT 180 BG 4	Manhattan	1
CT 181 BG 4	Manhattan	3
CT 182 BG 1	Manhattan	1
CT 182 BG 2	Manhattan	1
CT 182 BG 3	Manhattan	1
CT 182 BG 4	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 182 BG 5	Manhattan	1
CT 184 BG 1	Manhattan	1
CT 184 BG 2	Manhattan	1
CT 184 BG 3	Manhattan	1
CT 184 BG 4	Manhattan	1
CT 186 BG 1	Manhattan	1
CT 186 BG 2	Manhattan	1
CT 186 BG 3	Manhattan	1
CT 187 BG 5	Manhattan	1
CT 188 BG 1	Manhattan	1
CT 188 BG 2	Manhattan	1
CT 188 BG 3	Manhattan	1
CT 188 BG 4	Manhattan	1
CT 189 BG 2	Manhattan	3
CT 189 BG 3	Manhattan	1
CT 189 BG 4	Manhattan	1
CT 189 BG 5	Manhattan	1
CT 189 BG 6	Manhattan	1
CT 190 BG 1	Manhattan	1
CT 191 BG 3	Manhattan	2
CT 191 BG 5	Manhattan	3
CT 191 BG 6	Manhattan	1
CT 192 BG 1	Manhattan	1
CT 192 BG 2	Manhattan	1
CT 192 BG 3	Manhattan	1
CT 193 BG 1	Manhattan	3
CT 193 BG 2	Manhattan	1
CT 193 BG 3	Manhattan	1
CT 193 BG 4	Manhattan	1
CT 193 BG 5	Manhattan	1
CT 193 BG 6	Manhattan	1
CT 194 BG 1	Manhattan	1
CT 194 BG 2	Manhattan	3
CT 194 BG 3	Manhattan	1
CT 194 BG 4	Manhattan	1
CT 195 BG 3	Manhattan	2
CT 195 BG 4	Manhattan	1
CT 195 BG 5	Manhattan	2
CT 196 BG 1	Manhattan	1
CT 196 BG 2	Manhattan	1
CT 196 BG 3	Manhattan	1
CT 197.01 BG 1	Manhattan	1
CT 197.02 BG 1	Manhattan	1
CT 198 BG 1	Manhattan	3
CT 199 BG 3	Manhattan	2
CT 199 BG 5	Manhattan	2
CT 2.01 BG 1	Manhattan	1
CT 2.01 BG 2	Manhattan	1
CT 2.02 BG 1	Manhattan	1
CT 2.02 BG 2	Manhattan	1
CT 2.02 BG 3	Manhattan	1
CT 2.02 BG 4	Manhattan	1
CT 2.02 BG 5	Manhattan	1
CT 20 BG 1	Manhattan	1
CT 20 BG 2	Manhattan	1
CT 20 BG 3	Manhattan	1
CT 200 BG 1	Manhattan	3
CT 200 BG 2	Manhattan	3
CT 201.02 BG 1	Manhattan	1
CT 201.02 BG 2	Manhattan	1
CT 201.02 BG 3	Manhattan	3
CT 201.02 BG 4	Manhattan	3
CT 203 BG 1	Manhattan	1
CT 206 BG 1	Manhattan	1
CT 206 BG 2	Manhattan	1
CT 207.01 BG 1	Manhattan	1
CT 207.01 BG 2	Manhattan	3
CT 208 BG 1	Manhattan	1
CT 208 BG 2	Manhattan	3
CT 208 BG 3	Manhattan	3
CT 209.01 BG 1	Manhattan	1
CT 209.01 BG 2	Manhattan	1
CT 210 BG 1	Manhattan	1
CT 210 BG 2	Manhattan	1
CT 210 BG 3	Manhattan	1
CT 210 BG 4	Manhattan	1
CT 211 BG 1	Manhattan	1
CT 211 BG 3	Manhattan	1
CT 211 BG 4	Manhattan	1
CT 211 BG 5	Manhattan	1
CT 211 BG 6	Manhattan	3
CT 211 BG 7	Manhattan	1
CT 212 BG 1	Manhattan	1
CT 212 BG 2	Manhattan	3
CT 212 BG 3	Manhattan	3
CT 212 BG 4	Manhattan	3
CT 213.03 BG 1	Manhattan	1
CT 213.03 BG 2	Manhattan	1
CT 213.03 BG 3	Manhattan	1
CT 213.03 BG 4	Manhattan	1
CT 214 BG 1	Manhattan	1
CT 214 BG 2	Manhattan	3
CT 215 BG 1	Manhattan	1
CT 215 BG 2	Manhattan	1
CT 216 BG 1	Manhattan	3
CT 216 BG 2	Manhattan	1
CT 216 BG 3	Manhattan	1
CT 216 BG 4	Manhattan	3
CT 216 BG 5	Manhattan	1
CT 218 BG 1	Manhattan	3
CT 218 BG 2	Manhattan	1
CT 218 BG 3	Manhattan	1
CT 218 BG 4	Manhattan	1
CT 219 BG 1	Manhattan	1
CT 219 BG 2	Manhattan	1
CT 219 BG 3	Manhattan	1
CT 219 BG 4	Manhattan	1
CT 22.01 BG 1	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 22.01 BG 2	Manhattan	1
CT 22.01 BG 3	Manhattan	1
CT 22.01 BG 4	Manhattan	1
CT 22.02 BG 1	Manhattan	2
CT 220 BG 1	Manhattan	1
CT 220 BG 2	Manhattan	1
CT 220 BG 3	Manhattan	1
CT 220 BG 4	Manhattan	3
CT 220 BG 5	Manhattan	1
CT 221.02 BG 1	Manhattan	1
CT 221.02 BG 2	Manhattan	3
CT 222 BG 1	Manhattan	1
CT 222 BG 2	Manhattan	1
CT 223.01 BG 1	Manhattan	1
CT 223.01 BG 2	Manhattan	1
CT 223.01 BG 3	Manhattan	1
CT 223.01 BG 4	Manhattan	1
CT 223.02 BG 1	Manhattan	1
CT 224 BG 1	Manhattan	1
CT 224 BG 2	Manhattan	1
CT 224 BG 3	Manhattan	1
CT 224 BG 4	Manhattan	1
CT 225 BG 1	Manhattan	1
CT 225 BG 2	Manhattan	1
CT 225 BG 3	Manhattan	1
CT 225 BG 4	Manhattan	1
CT 225 BG 5	Manhattan	1
CT 226 BG 1	Manhattan	1
CT 226 BG 2	Manhattan	1
CT 226 BG 3	Manhattan	1
CT 227 BG 1	Manhattan	1
CT 227 BG 2	Manhattan	1
CT 227 BG 3	Manhattan	1
CT 228 BG 1	Manhattan	1
CT 228 BG 2	Manhattan	1
CT 228 BG 3	Manhattan	3
CT 228 BG 4	Manhattan	3
CT 229 BG 1	Manhattan	1
CT 229 BG 2	Manhattan	1
CT 229 BG 3	Manhattan	1
CT 229 BG 4	Manhattan	1
CT 229 BG 5	Manhattan	1
CT 230 BG 1	Manhattan	1
CT 230 BG 2	Manhattan	1
CT 230 BG 3	Manhattan	1
CT 230 BG 4	Manhattan	1
CT 230 BG 5	Manhattan	1
CT 231 BG 1	Manhattan	1
CT 231 BG 2	Manhattan	1
CT 231 BG 3	Manhattan	1
CT 232 BG 1	Manhattan	1
CT 232 BG 2	Manhattan	1
CT 232 BG 3	Manhattan	1
CT 232 BG 4	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 233 BG 1	Manhattan	1
CT 233 BG 2	Manhattan	1
CT 233 BG 3	Manhattan	1
CT 234 BG 1	Manhattan	1
CT 234 BG 2	Manhattan	1
CT 235.01 BG 1	Manhattan	1
CT 235.01 BG 2	Manhattan	1
CT 235.01 BG 3	Manhattan	1
CT 235.01 BG 4	Manhattan	1
CT 235.02 BG 1	Manhattan	1
CT 236 BG 1	Manhattan	1
CT 236 BG 2	Manhattan	3
CT 236 BG 3	Manhattan	1
CT 236 BG 4	Manhattan	1
CT 237 BG 1	Manhattan	1
CT 237 BG 2	Manhattan	1
CT 237 BG 3	Manhattan	1
CT 238.01 BG 1	Manhattan	3
CT 238.02 BG 1	Manhattan	3
CT 238.02 BG 2	Manhattan	1
CT 239 BG 1	Manhattan	1
CT 239 BG 2	Manhattan	1
CT 24 BG 1	Manhattan	1
CT 24 BG 2	Manhattan	1
CT 240 BG 1	Manhattan	1
CT 241 BG 1	Manhattan	3
CT 241 BG 2	Manhattan	3
CT 241 BG 3	Manhattan	1
CT 241 BG 4	Manhattan	3
CT 241 BG 5	Manhattan	1
CT 242 BG 1	Manhattan	1
CT 242 BG 2	Manhattan	1
CT 242 BG 3	Manhattan	1
CT 243.01 BG 1	Manhattan	1
CT 243.01 BG 2	Manhattan	1
CT 243.01 BG 3	Manhattan	1
CT 243.02 BG 1	Manhattan	1
CT 243.02 BG 2	Manhattan	1
CT 243.02 BG 3	Manhattan	1
CT 245 BG 1	Manhattan	1
CT 245 BG 2	Manhattan	3
CT 245 BG 3	Manhattan	3
CT 245 BG 4	Manhattan	1
CT 245 BG 5	Manhattan	1
CT 245 BG 6	Manhattan	1
CT 245 BG 7	Manhattan	1
CT 247 BG 1	Manhattan	3
CT 247 BG 2	Manhattan	1
CT 247 BG 3	Manhattan	1
CT 247 BG 4	Manhattan	1
CT 247 BG 5	Manhattan	1
CT 249 BG 1	Manhattan	1
CT 25 BG 1	Manhattan	1
CT 25 BG 2	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 25 BG 3	Manhattan	1
CT 251 BG 1	Manhattan	1
CT 251 BG 2	Manhattan	1
CT 253 BG 1	Manhattan	1
CT 253 BG 2	Manhattan	1
CT 253 BG 3	Manhattan	1
CT 253 BG 4	Manhattan	1
CT 253 BG 5	Manhattan	1
CT 253 BG 6	Manhattan	1
CT 255 BG 1	Manhattan	1
CT 255 BG 2	Manhattan	1
CT 255 BG 3	Manhattan	1
CT 255 BG 4	Manhattan	3
CT 257 BG 1	Manhattan	1
CT 257 BG 2	Manhattan	3
CT 257 BG 3	Manhattan	3
CT 259 BG 1	Manhattan	1
CT 259 BG 2	Manhattan	1
CT 26.01 BG 1	Manhattan	1
CT 26.01 BG 2	Manhattan	1
CT 26.02 BG 1	Manhattan	1
CT 26.02 BG 2	Manhattan	2
CT 261 BG 1	Manhattan	1
CT 261 BG 2	Manhattan	1
CT 261 BG 3	Manhattan	1
CT 261 BG 4	Manhattan	1
CT 261 BG 5	Manhattan	1
CT 261 BG 6	Manhattan	3
CT 261 BG 7	Manhattan	1
CT 263 BG 1	Manhattan	1
CT 263 BG 2	Manhattan	1
CT 263 BG 3	Manhattan	1
CT 263 BG 4	Manhattan	1
CT 263 BG 5	Manhattan	1
CT 265 BG 1	Manhattan	1
CT 265 BG 2	Manhattan	1
CT 265 BG 3	Manhattan	3
CT 265 BG 4	Manhattan	3
CT 265 BG 5	Manhattan	1
CT 267 BG 1	Manhattan	2
CT 269 BG 1	Manhattan	1
CT 269 BG 2	Manhattan	1
CT 269 BG 3	Manhattan	3
CT 269 BG 4	Manhattan	1
CT 269 BG 5	Manhattan	1
CT 269 BG 6	Manhattan	1
CT 27 BG 1	Manhattan	1
CT 271 BG 1	Manhattan	1
CT 271 BG 2	Manhattan	1
CT 271 BG 3	Manhattan	1
CT 271 BG 4	Manhattan	1
CT 271 BG 5	Manhattan	2
CT 277 BG 1	Manhattan	1
CT 277 BG 2	Manhattan	1
CT 277 BG 3	Manhattan	1
CT 277 BG 4	Manhattan	1
CT 279 BG 1	Manhattan	2
CT 279 BG 2	Manhattan	1
CT 279 BG 3	Manhattan	1
CT 279 BG 4	Manhattan	1
CT 279 BG 5	Manhattan	3
CT 279 BG 6	Manhattan	1
CT 279 BG 7	Manhattan	1
CT 28 BG 1	Manhattan	1
CT 28 BG 2	Manhattan	1
CT 28 BG 3	Manhattan	1
CT 28 BG 4	Manhattan	1
CT 283 BG 1	Manhattan	3
CT 283 BG 2	Manhattan	3
CT 283 BG 3	Manhattan	1
CT 283 BG 4	Manhattan	1
CT 285 BG 1	Manhattan	1
CT 285 BG 2	Manhattan	1
CT 285 BG 3	Manhattan	1
CT 285 BG 4	Manhattan	1
CT 287 BG 2	Manhattan	1
CT 287 BG 3	Manhattan	1
CT 29 BG 1	Manhattan	1
CT 29 BG 2	Manhattan	1
CT 29 BG 3	Manhattan	1
CT 29 BG 4	Manhattan	1
CT 291 BG 1	Manhattan	1
CT 291 BG 2	Manhattan	1
CT 291 BG 3	Manhattan	1
CT 291 BG 4	Manhattan	1
CT 291 BG 5	Manhattan	1
CT 291 BG 6	Manhattan	1
CT 291 BG 7	Manhattan	1
CT 293 BG 1	Manhattan	1
CT 293 BG 2	Manhattan	1
CT 293 BG 3	Manhattan	1
CT 293 BG 4	Manhattan	1
CT 293 BG 5	Manhattan	1
CT 295 BG 2	Manhattan	1
CT 295 BG 3	Manhattan	1
CT 295 BG 4	Manhattan	3
CT 297 BG 1	Manhattan	3
CT 299 BG 1	Manhattan	1
CT 299 BG 2	Manhattan	1
CT 30.01 BG 2	Manhattan	2
CT 30.01 BG 3	Manhattan	1
CT 30.01 BG 4	Manhattan	3
CT 30.02 BG 2	Manhattan	1
CT 303 BG 1	Manhattan	1
CT 303 BG 2	Manhattan	1
CT 307 BG 1	Manhattan	3
CT 307 BG 3	Manhattan	2
CT 309 BG 1	Manhattan	1

Census Tract & Block Group ID	Place Name	Category
CT 309 BG 2	Manhattan	1
CT 309 BG 3	Manhattan	1
CT 309 BG 4	Manhattan	3
CT 32 BG 3	Manhattan	2
CT 32 BG 5	Manhattan	2
CT 34 BG 1	Manhattan	2
CT 34 BG 2	Manhattan	1
CT 34 BG 3	Manhattan	2
CT 34 BG 4	Manhattan	2
CT 36.01 BG 1	Manhattan	1
CT 36.01 BG 2	Manhattan	3
CT 36.01 BG 3	Manhattan	1
CT 36.02 BG 2	Manhattan	1
CT 38 BG 1	Manhattan	2
CT 38 BG 3	Manhattan	3
CT 40 BG 4	Manhattan	1
CT 41 BG 2	Manhattan	3
CT 41 BG 3	Manhattan	1
CT 41 BG 4	Manhattan	1
CT 41 BG 5	Manhattan	1
CT 41 BG 6	Manhattan	1
CT 43 BG 2	Manhattan	1
CT 48 BG 5	Manhattan	3
CT 48 BG 6	Manhattan	2
CT 56 BG 1	Manhattan	2
CT 6 BG 1	Manhattan	1
CT 6 BG 2	Manhattan	1
CT 6 BG 3	Manhattan	1
CT 6 BG 4	Manhattan	1
CT 6 BG 5	Manhattan	1
CT 6 BG 6	Manhattan	1
CT 62 BG 1	Manhattan	1
CT 62 BG 2	Manhattan	3
CT 64 BG 4	Manhattan	2
CT 64 BG 5	Manhattan	3
CT 64 BG 6	Manhattan	2
CT 66 BG 2	Manhattan	1
CT 66 BG 7	Manhattan	1
CT 66 BG 8	Manhattan	2
CT 66 BG 9	Manhattan	1
CT 68 BG 4	Manhattan	2
CT 68 BG 5	Manhattan	3
CT 72 BG 2	Manhattan	2
CT 72 BG 4	Manhattan	2
CT 74 BG 1	Manhattan	3
CT 76 BG 1	Manhattan	3
CT 78 BG 6	Manhattan	3
CT 78 BG 7	Manhattan	2
CT 8 BG 1	Manhattan	1
CT 8 BG 2	Manhattan	1
CT 8 BG 3	Manhattan	1
CT 8 BG 4	Manhattan	1
CT 8 BG 5	Manhattan	1
CT 8 BG 6	Manhattan	1
CT 81 BG 2	Manhattan	2
CT 83 BG 3	Manhattan	1
CT 84 BG 2	Manhattan	3
CT 88 BG 5	Manhattan	1
CT 89 BG 3	Manhattan	1
CT 91 BG 3	Manhattan	2
CT 93 BG 1	Manhattan	2
CT 93 BG 6	Manhattan	1
CT 97 BG 2	Manhattan	1
CT 97 BG 3	Manhattan	3
CT 97 BG 4	Manhattan	1

Table G-EJ14. Census Tracts (CT) and Block Groups (BG) in Kings County, New York (County ID 36-047) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 100 BG 1	Brooklyn	1
CT 100 BG 2	Brooklyn	1
CT 100 BG 3	Brooklyn	1
CT 100 BG 4	Brooklyn	1
CT 1004 BG 1	Brooklyn	3
CT 1006 BG 1	Brooklyn	3
CT 1006 BG 2	Brooklyn	3
CT 1008 BG 1	Brooklyn	3
CT 1008 BG 2	Brooklyn	3
CT 101 BG 1	Brooklyn	3
CT 101 BG 2	Brooklyn	3
CT 101 BG 3	Brooklyn	1
CT 1010 BG 1	Brooklyn	3
CT 1010 BG 2	Brooklyn	3
CT 1012 BG 1	Brooklyn	3
CT 1012 BG 2	Brooklyn	1
CT 1014 BG 1	Brooklyn	3
CT 1014 BG 2	Brooklyn	3
CT 1016 BG 1	Brooklyn	3
CT 1018 BG 1	Brooklyn	3
CT 102 BG 1	Brooklyn	1
CT 102 BG 2	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 102 BG 3	Brooklyn	1
CT 1020 BG 1	Brooklyn	3
CT 1022 BG 1	Brooklyn	3
CT 1024 BG 1	Brooklyn	3
CT 1026 BG 1	Brooklyn	3
CT 1028 BG 1	Brooklyn	3
CT 1028 BG 2	Brooklyn	3
CT 1034 BG 1	Brooklyn	1
CT 104 BG 1	Brooklyn	1
CT 104 BG 2	Brooklyn	1
CT 104 BG 3	Brooklyn	1
CT 1058.01 BG 1	Brooklyn	1
CT 1058.01 BG 2	Brooklyn	1
CT 1058.01 BG 3	Brooklyn	1
CT 1058.04 BG 1	Brooklyn	3
CT 1058.04 BG 2	Brooklyn	2
CT 1058.04 BG 3	Brooklyn	3
CT 1058.04 BG 4	Brooklyn	1
CT 106 BG 1	Brooklyn	1
CT 106 BG 2	Brooklyn	1
CT 106 BG 3	Brooklyn	1
CT 1070 BG 1	Brooklyn	3
CT 1078 BG 1	Brooklyn	1
CT 1078 BG 2	Brooklyn	3
CT 1078 BG 3	Brooklyn	3
CT 1078 BG 4	Brooklyn	3
CT 108 BG 1	Brooklyn	1
CT 108 BG 2	Brooklyn	1
CT 108 BG 3	Brooklyn	1
CT 1098 BG 1	Brooklyn	3
CT 1098 BG 2	Brooklyn	1
CT 110 BG 1	Brooklyn	1
CT 110 BG 2	Brooklyn	1
CT 1104 BG 1	Brooklyn	3
CT 1104 BG 2	Brooklyn	1
CT 1104 BG 3	Brooklyn	1
CT 1104 BG 4	Brooklyn	3
CT 1106 BG 1	Brooklyn	1
CT 1106 BG 2	Brooklyn	1
CT 1110 BG 1	Brooklyn	1
CT 1110 BG 2	Brooklyn	1
CT 1116 BG 1	Brooklyn	1
CT 1116 BG 2	Brooklyn	3
CT 1118 BG 1	Brooklyn	1
CT 1118 BG 2	Brooklyn	1
CT 112 BG 1	Brooklyn	1
CT 112 BG 2	Brooklyn	2
CT 112 BG 3	Brooklyn	1
CT 112 BG 4	Brooklyn	1
CT 1120 BG 1	Brooklyn	1
CT 1120 BG 2	Brooklyn	1
CT 1122 BG 1	Brooklyn	1
CT 1122 BG 2	Brooklyn	1
CT 1124 BG 1	Brooklyn	3
CT 1124 BG 2	Brooklyn	3
CT 1124 BG 3	Brooklyn	3
CT 1126 BG 1	Brooklyn	1
CT 1126 BG 2	Brooklyn	1
CT 1126 BG 3	Brooklyn	3
CT 1128 BG 1	Brooklyn	1
CT 1128 BG 2	Brooklyn	3
CT 1128 BG 3	Brooklyn	1
CT 1130 BG 1	Brooklyn	1
CT 1130 BG 2	Brooklyn	1
CT 1130 BG 3	Brooklyn	1
CT 1130 BG 4	Brooklyn	3
CT 1132 BG 1	Brooklyn	3
CT 1132 BG 2	Brooklyn	3
CT 1134 BG 1	Brooklyn	1
CT 1134 BG 2	Brooklyn	1
CT 1134 BG 3	Brooklyn	1
CT 114 BG 1	Brooklyn	1
CT 114 BG 2	Brooklyn	2
CT 114 BG 3	Brooklyn	1
CT 1142.01 BG 1	Brooklyn	1
CT 1142.01 BG 2	Brooklyn	1
CT 1142.02 BG 1	Brooklyn	1
CT 1142.02 BG 2	Brooklyn	3
CT 1144 BG 1	Brooklyn	1
CT 1144 BG 2	Brooklyn	1
CT 1144 BG 3	Brooklyn	3
CT 1144 BG 4	Brooklyn	1
CT 1146 BG 1	Brooklyn	1
CT 1146 BG 2	Brooklyn	1
CT 1150 BG 1	Brooklyn	1
CT 1150 BG 2	Brooklyn	1
CT 1150 BG 3	Brooklyn	1
CT 1152 BG 1	Brooklyn	3
CT 1152 BG 2	Brooklyn	1
CT 1152 BG 3	Brooklyn	1
CT 1156 BG 1	Brooklyn	3
CT 1156 BG 2	Brooklyn	1
CT 1156 BG 3	Brooklyn	1
CT 1156 BG 4	Brooklyn	3
CT 1158 BG 1	Brooklyn	1
CT 1158 BG 2	Brooklyn	3
CT 1158 BG 3	Brooklyn	3
CT 116 BG 1	Brooklyn	1
CT 116 BG 2	Brooklyn	1
CT 116 BG 3	Brooklyn	1
CT 1160 BG 1	Brooklyn	1
CT 1160 BG 2	Brooklyn	1
CT 1160 BG 3	Brooklyn	1
CT 1162 BG 1	Brooklyn	3
CT 1162 BG 2	Brooklyn	1
CT 1162 BG 3	Brooklyn	1
CT 1164 BG 1	Brooklyn	1
CT 1164 BG 2	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 1164 BG 3	Brooklyn	1
CT 1166 BG 1	Brooklyn	3
CT 1166 BG 2	Brooklyn	1
CT 1166 BG 3	Brooklyn	1
CT 1168 BG 1	Brooklyn	3
CT 1168 BG 2	Brooklyn	3
CT 1170 BG 1	Brooklyn	1
CT 1170 BG 2	Brooklyn	1
CT 1172.01 BG 1	Brooklyn	3
CT 1172.01 BG 2	Brooklyn	1
CT 1172.02 BG 1	Brooklyn	3
CT 1172.02 BG 2	Brooklyn	3
CT 1174 BG 1	Brooklyn	1
CT 1174 BG 2	Brooklyn	1
CT 1176.01 BG 1	Brooklyn	3
CT 1176.01 BG 2	Brooklyn	1
CT 1176.02 BG 1	Brooklyn	1
CT 1176.02 BG 2	Brooklyn	1
CT 1178 BG 1	Brooklyn	1
CT 118 BG 1	Brooklyn	1
CT 118 BG 2	Brooklyn	1
CT 1182.01 BG 1	Brooklyn	3
CT 1182.01 BG 2	Brooklyn	3
CT 1182.02 BG 1	Brooklyn	1
CT 1182.02 BG 2	Brooklyn	1
CT 1184 BG 1	Brooklyn	1
CT 1184 BG 2	Brooklyn	3
CT 1184 BG 3	Brooklyn	1
CT 1186 BG 1	Brooklyn	3
CT 1186 BG 2	Brooklyn	3
CT 1188 BG 1	Brooklyn	3
CT 1188 BG 2	Brooklyn	1
CT 1188 BG 3	Brooklyn	1
CT 1190 BG 1	Brooklyn	1
CT 1190 BG 2	Brooklyn	1
CT 1192 BG 1	Brooklyn	1
CT 1192 BG 2	Brooklyn	3
CT 1192 BG 3	Brooklyn	1
CT 1194 BG 1	Brooklyn	3
CT 1194 BG 2	Brooklyn	1
CT 1194 BG 3	Brooklyn	1
CT 1196 BG 1	Brooklyn	1
CT 1196 BG 2	Brooklyn	1
CT 1196 BG 3	Brooklyn	1
CT 1196 BG 4	Brooklyn	1
CT 1198 BG 1	Brooklyn	1
CT 1198 BG 2	Brooklyn	1
CT 1198 BG 3	Brooklyn	1
CT 120 BG 1	Brooklyn	1
CT 1200 BG 1	Brooklyn	1
CT 1200 BG 2	Brooklyn	1
CT 1202 BG 1	Brooklyn	1
CT 1202 BG 2	Brooklyn	1
CT 1208 BG 1	Brooklyn	3
CT 1208 BG 2	Brooklyn	1
CT 1208 BG 3	Brooklyn	1
CT 1208 BG 4	Brooklyn	3
CT 1208 BG 5	Brooklyn	1
CT 121 BG 2	Brooklyn	1
CT 1210 BG 1	Brooklyn	1
CT 1210 BG 2	Brooklyn	1
CT 1214 BG 1	Brooklyn	1
CT 1214 BG 2	Brooklyn	1
CT 122 BG 1	Brooklyn	1
CT 122 BG 2	Brooklyn	1
CT 122 BG 3	Brooklyn	1
CT 1220 BG 1	Brooklyn	1
CT 1220 BG 2	Brooklyn	1
CT 1237 BG 1	Brooklyn	2
CT 1237 BG 2	Brooklyn	2
CT 1237 BG 3	Brooklyn	2
CT 126 BG 1	Brooklyn	1
CT 126 BG 2	Brooklyn	1
CT 126 BG 3	Brooklyn	1
CT 127 BG 3	Brooklyn	1
CT 128.01 BG 1	Brooklyn	1
CT 129.01 BG 1	Brooklyn	3
CT 13 BG 2	Brooklyn	2
CT 130 BG 1	Brooklyn	1
CT 130 BG 2	Brooklyn	2
CT 130 BG 4	Brooklyn	1
CT 131 BG 4	Brooklyn	3
CT 132 BG 1	Brooklyn	1
CT 132 BG 2	Brooklyn	1
CT 136 BG 3	Brooklyn	2
CT 138 BG 2	Brooklyn	3
CT 141 BG 1	Brooklyn	3
CT 143 BG 1	Brooklyn	3
CT 143 BG 3	Brooklyn	3
CT 145 BG 1	Brooklyn	3
CT 15 BG 1	Brooklyn	3
CT 15 BG 2	Brooklyn	1
CT 15 BG 3	Brooklyn	3
CT 152 BG 3	Brooklyn	3
CT 1522 BG 1	Brooklyn	3
CT 1522 BG 2	Brooklyn	3
CT 153 BG 1	Brooklyn	3
CT 160 BG 1	Brooklyn	3
CT 160 BG 2	Brooklyn	3
CT 160 BG 3	Brooklyn	3
CT 161 BG 1	Brooklyn	3
CT 163 BG 1	Brooklyn	3
CT 164 BG 1	Brooklyn	3
CT 170 BG 1	Brooklyn	3
CT 170 BG 3	Brooklyn	3
CT 172 BG 1	Brooklyn	3
CT 172 BG 2	Brooklyn	3
CT 176 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 176 BG 2	Brooklyn	2
CT 178 BG 1	Brooklyn	1
CT 178 BG 2	Brooklyn	3
CT 179 BG 1	Brooklyn	1
CT 179 BG 2	Brooklyn	3
CT 179 BG 3	Brooklyn	3
CT 18 BG 1	Brooklyn	3
CT 180 BG 1	Brooklyn	3
CT 180 BG 2	Brooklyn	3
CT 181 BG 1	Brooklyn	3
CT 181 BG 2	Brooklyn	3
CT 182 BG 1	Brooklyn	1
CT 182 BG 2	Brooklyn	3
CT 184 BG 1	Brooklyn	3
CT 184 BG 2	Brooklyn	3
CT 185.01 BG 1	Brooklyn	3
CT 185.01 BG 2	Brooklyn	1
CT 185.01 BG 3	Brooklyn	1
CT 185.01 BG 4	Brooklyn	1
CT 186 BG 1	Brooklyn	1
CT 187 BG 1	Brooklyn	1
CT 188 BG 2	Brooklyn	3
CT 190 BG 1	Brooklyn	1
CT 190 BG 2	Brooklyn	1
CT 190 BG 3	Brooklyn	1
CT 191 BG 1	Brooklyn	2
CT 191 BG 3	Brooklyn	3
CT 192 BG 1	Brooklyn	2
CT 192 BG 2	Brooklyn	1
CT 193 BG 1	Brooklyn	2
CT 193 BG 2	Brooklyn	3
CT 193 BG 3	Brooklyn	3
CT 193 BG 4	Brooklyn	3
CT 194 BG 1	Brooklyn	1
CT 194 BG 2	Brooklyn	1
CT 195 BG 2	Brooklyn	3
CT 195 BG 3	Brooklyn	3
CT 196 BG 1	Brooklyn	1
CT 196 BG 2	Brooklyn	2
CT 196 BG 3	Brooklyn	1
CT 197 BG 1	Brooklyn	3
CT 197 BG 4	Brooklyn	3
CT 198 BG 1	Brooklyn	3
CT 198 BG 2	Brooklyn	2
CT 199 BG 3	Brooklyn	3
CT 2 BG 1	Brooklyn	1
CT 20 BG 1	Brooklyn	1
CT 20 BG 2	Brooklyn	1
CT 200 BG 1	Brooklyn	1
CT 200 BG 2	Brooklyn	3
CT 201 BG 1	Brooklyn	3
CT 201 BG 4	Brooklyn	3
CT 202 BG 1	Brooklyn	3
CT 203 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 203 BG 2	Brooklyn	3
CT 205 BG 2	Brooklyn	3
CT 205 BG 3	Brooklyn	3
CT 206 BG 1	Brooklyn	3
CT 208 BG 1	Brooklyn	1
CT 208 BG 2	Brooklyn	3
CT 208 BG 3	Brooklyn	1
CT 210 BG 1	Brooklyn	1
CT 210 BG 2	Brooklyn	1
CT 210 BG 3	Brooklyn	1
CT 211 BG 1	Brooklyn	3
CT 211 BG 2	Brooklyn	3
CT 212 BG 1	Brooklyn	1
CT 212 BG 2	Brooklyn	1
CT 212 BG 3	Brooklyn	1
CT 213 BG 1	Brooklyn	3
CT 213 BG 2	Brooklyn	3
CT 213 BG 3	Brooklyn	3
CT 214 BG 1	Brooklyn	2
CT 214 BG 2	Brooklyn	1
CT 215 BG 2	Brooklyn	1
CT 215 BG 3	Brooklyn	3
CT 215 BG 4	Brooklyn	3
CT 216 BG 1	Brooklyn	2
CT 216 BG 2	Brooklyn	2
CT 216 BG 3	Brooklyn	2
CT 217 BG 1	Brooklyn	3
CT 217 BG 2	Brooklyn	3
CT 218 BG 1	Brooklyn	2
CT 218 BG 2	Brooklyn	2
CT 218 BG 3	Brooklyn	2
CT 219 BG 1	Brooklyn	3
CT 219 BG 2	Brooklyn	3
CT 219 BG 3	Brooklyn	3
CT 22 BG 1	Brooklyn	1
CT 22 BG 2	Brooklyn	3
CT 22 BG 3	Brooklyn	3
CT 220 BG 1	Brooklyn	2
CT 220 BG 2	Brooklyn	2
CT 220 BG 3	Brooklyn	2
CT 220 BG 4	Brooklyn	2
CT 221 BG 1	Brooklyn	1
CT 221 BG 2	Brooklyn	3
CT 221 BG 3	Brooklyn	3
CT 222 BG 1	Brooklyn	2
CT 222 BG 2	Brooklyn	2
CT 222 BG 3	Brooklyn	2
CT 224 BG 1	Brooklyn	2
CT 224 BG 2	Brooklyn	2
CT 224 BG 3	Brooklyn	2
CT 224 BG 4	Brooklyn	2
CT 226 BG 1	Brooklyn	1
CT 226 BG 2	Brooklyn	1
CT 227 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 227 BG 2	Brooklyn	3
CT 227 BG 3	Brooklyn	3
CT 227 BG 4	Brooklyn	3
CT 228 BG 1	Brooklyn	1
CT 228 BG 2	Brooklyn	2
CT 228 BG 3	Brooklyn	2
CT 229 BG 1	Brooklyn	3
CT 229 BG 2	Brooklyn	3
CT 229 BG 3	Brooklyn	1
CT 229 BG 4	Brooklyn	3
CT 23 BG 1	Brooklyn	1
CT 23 BG 2	Brooklyn	1
CT 23 BG 3	Brooklyn	1
CT 230 BG 1	Brooklyn	2
CT 230 BG 2	Brooklyn	2
CT 230 BG 3	Brooklyn	2
CT 231 BG 1	Brooklyn	3
CT 231 BG 2	Brooklyn	3
CT 231 BG 3	Brooklyn	3
CT 232 BG 1	Brooklyn	2
CT 232 BG 2	Brooklyn	2
CT 232 BG 3	Brooklyn	2
CT 232 BG 4	Brooklyn	2
CT 232 BG 5	Brooklyn	2
CT 233 BG 2	Brooklyn	1
CT 234 BG 1	Brooklyn	2
CT 234 BG 2	Brooklyn	2
CT 234 BG 3	Brooklyn	2
CT 235 BG 1	Brooklyn	2
CT 235 BG 2	Brooklyn	2
CT 236 BG 1	Brooklyn	2
CT 236 BG 2	Brooklyn	2
CT 236 BG 3	Brooklyn	2
CT 236 BG 4	Brooklyn	2
CT 238 BG 1	Brooklyn	2
CT 238 BG 2	Brooklyn	2
CT 238 BG 3	Brooklyn	2
CT 240 BG 1	Brooklyn	2
CT 240 BG 2	Brooklyn	2
CT 240 BG 3	Brooklyn	2
CT 241 BG 2	Brooklyn	1
CT 242 BG 1	Brooklyn	2
CT 242 BG 2	Brooklyn	2
CT 243 BG 1	Brooklyn	3
CT 243 BG 2	Brooklyn	3
CT 243 BG 3	Brooklyn	3
CT 244 BG 1	Brooklyn	2
CT 244 BG 2	Brooklyn	2
CT 244 BG 3	Brooklyn	2
CT 245 BG 1	Brooklyn	3
CT 245 BG 2	Brooklyn	1
CT 245 BG 3	Brooklyn	3
CT 245 BG 4	Brooklyn	3
CT 246 BG 2	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 246 BG 3	Brooklyn	2
CT 247 BG 1	Brooklyn	1
CT 247 BG 2	Brooklyn	1
CT 248 BG 1	Brooklyn	3
CT 248 BG 2	Brooklyn	3
CT 249 BG 1	Brooklyn	3
CT 249 BG 2	Brooklyn	3
CT 249 BG 3	Brooklyn	3
CT 250 BG 1	Brooklyn	1
CT 250 BG 2	Brooklyn	1
CT 251 BG 1	Brooklyn	1
CT 251 BG 2	Brooklyn	1
CT 251 BG 3	Brooklyn	3
CT 252 BG 1	Brooklyn	3
CT 252 BG 2	Brooklyn	2
CT 252 BG 3	Brooklyn	3
CT 252 BG 4	Brooklyn	3
CT 253 BG 1	Brooklyn	1
CT 253 BG 2	Brooklyn	1
CT 253 BG 3	Brooklyn	1
CT 254 BG 1	Brooklyn	3
CT 254 BG 3	Brooklyn	1
CT 255 BG 1	Brooklyn	1
CT 255 BG 2	Brooklyn	1
CT 256 BG 1	Brooklyn	1
CT 256 BG 2	Brooklyn	1
CT 257 BG 1	Brooklyn	1
CT 257 BG 2	Brooklyn	1
CT 257 BG 3	Brooklyn	3
CT 258 BG 1	Brooklyn	1
CT 258 BG 2	Brooklyn	1
CT 259.01 BG 1	Brooklyn	1
CT 259.02 BG 1	Brooklyn	1
CT 260 BG 1	Brooklyn	1
CT 260 BG 2	Brooklyn	1
CT 260 BG 3	Brooklyn	3
CT 261 BG 1	Brooklyn	1
CT 261 BG 2	Brooklyn	3
CT 261 BG 3	Brooklyn	1
CT 261 BG 4	Brooklyn	1
CT 261 BG 5	Brooklyn	3
CT 262 BG 1	Brooklyn	1
CT 262 BG 2	Brooklyn	1
CT 263 BG 1	Brooklyn	1
CT 264 BG 1	Brooklyn	1
CT 264 BG 2	Brooklyn	3
CT 264 BG 3	Brooklyn	1
CT 264 BG 4	Brooklyn	3
CT 265 BG 1	Brooklyn	3
CT 265 BG 2	Brooklyn	3
CT 265 BG 3	Brooklyn	3
CT 265 BG 4	Brooklyn	3
CT 266 BG 1	Brooklyn	1
CT 266 BG 2	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 266 BG 3	Brooklyn	1
CT 267 BG 1	Brooklyn	1
CT 267 BG 2	Brooklyn	3
CT 267 BG 3	Brooklyn	3
CT 267 BG 4	Brooklyn	3
CT 268 BG 1	Brooklyn	1
CT 268 BG 2	Brooklyn	3
CT 268 BG 3	Brooklyn	3
CT 268 BG 4	Brooklyn	2
CT 269 BG 1	Brooklyn	3
CT 269 BG 2	Brooklyn	3
CT 269 BG 3	Brooklyn	3
CT 270 BG 2	Brooklyn	2
CT 271 BG 1	Brooklyn	3
CT 271 BG 2	Brooklyn	3
CT 272 BG 1	Brooklyn	3
CT 272 BG 2	Brooklyn	1
CT 273 BG 1	Brooklyn	3
CT 273 BG 2	Brooklyn	3
CT 273 BG 3	Brooklyn	1
CT 274 BG 1	Brooklyn	3
CT 274 BG 2	Brooklyn	2
CT 275 BG 1	Brooklyn	1
CT 275 BG 2	Brooklyn	3
CT 275 BG 3	Brooklyn	3
CT 275 BG 4	Brooklyn	3
CT 276 BG 1	Brooklyn	1
CT 276 BG 2	Brooklyn	1
CT 276 BG 3	Brooklyn	1
CT 277 BG 1	Brooklyn	1
CT 277 BG 2	Brooklyn	3
CT 277 BG 3	Brooklyn	1
CT 277 BG 4	Brooklyn	1
CT 278 BG 2	Brooklyn	3
CT 279 BG 1	Brooklyn	1
CT 279 BG 2	Brooklyn	3
CT 279 BG 3	Brooklyn	3
CT 279 BG 4	Brooklyn	3
CT 280 BG 1	Brooklyn	3
CT 280 BG 2	Brooklyn	3
CT 281 BG 1	Brooklyn	1
CT 281 BG 2	Brooklyn	1
CT 281 BG 3	Brooklyn	1
CT 282 BG 1	Brooklyn	3
CT 282 BG 2	Brooklyn	1
CT 282 BG 3	Brooklyn	2
CT 283 BG 1	Brooklyn	1
CT 283 BG 2	Brooklyn	1
CT 283 BG 3	Brooklyn	1
CT 284 BG 1	Brooklyn	3
CT 284 BG 2	Brooklyn	2
CT 284 BG 3	Brooklyn	1
CT 285.01 BG 1	Brooklyn	1
CT 285.02 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 286 BG 2	Brooklyn	2
CT 286 BG 3	Brooklyn	1
CT 286 BG 4	Brooklyn	1
CT 286 BG 5	Brooklyn	1
CT 287 BG 1	Brooklyn	3
CT 287 BG 2	Brooklyn	1
CT 287 BG 3	Brooklyn	1
CT 288 BG 1	Brooklyn	1
CT 288 BG 2	Brooklyn	1
CT 288 BG 3	Brooklyn	1
CT 289 BG 1	Brooklyn	3
CT 289 BG 2	Brooklyn	3
CT 289 BG 3	Brooklyn	3
CT 289 BG 4	Brooklyn	1
CT 29.01 BG 1	Brooklyn	1
CT 29.01 BG 2	Brooklyn	1
CT 290 BG 1	Brooklyn	2
CT 290 BG 3	Brooklyn	3
CT 291 BG 1	Brooklyn	3
CT 291 BG 2	Brooklyn	1
CT 291 BG 3	Brooklyn	3
CT 292 BG 1	Brooklyn	1
CT 292 BG 2	Brooklyn	3
CT 293 BG 1	Brooklyn	1
CT 293 BG 2	Brooklyn	1
CT 293 BG 3	Brooklyn	3
CT 293 BG 4	Brooklyn	3
CT 294 BG 1	Brooklyn	1
CT 295 BG 1	Brooklyn	3
CT 295 BG 2	Brooklyn	3
CT 295 BG 3	Brooklyn	3
CT 295 BG 4	Brooklyn	3
CT 296 BG 1	Brooklyn	2
CT 296 BG 2	Brooklyn	3
CT 296 BG 3	Brooklyn	3
CT 296 BG 4	Brooklyn	1
CT 297 BG 1	Brooklyn	3
CT 297 BG 2	Brooklyn	1
CT 297 BG 3	Brooklyn	3
CT 298 BG 1	Brooklyn	3
CT 298 BG 2	Brooklyn	3
CT 298 BG 3	Brooklyn	2
CT 299 BG 1	Brooklyn	1
CT 299 BG 2	Brooklyn	1
CT 300 BG 1	Brooklyn	1
CT 300 BG 2	Brooklyn	1
CT 301 BG 1	Brooklyn	1
CT 301 BG 2	Brooklyn	1
CT 301 BG 3	Brooklyn	3
CT 302 BG 1	Brooklyn	3
CT 302 BG 2	Brooklyn	3
CT 302 BG 3	Brooklyn	1
CT 303 BG 1	Brooklyn	3
CT 303 BG 2	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 303 BG 3	Brooklyn	1
CT 304 BG 1	Brooklyn	3
CT 304 BG 2	Brooklyn	2
CT 304 BG 3	Brooklyn	1
CT 305 BG 1	Brooklyn	3
CT 305 BG 2	Brooklyn	3
CT 305 BG 3	Brooklyn	3
CT 305 BG 4	Brooklyn	3
CT 306 BG 1	Brooklyn	1
CT 307 BG 1	Brooklyn	1
CT 307 BG 2	Brooklyn	1
CT 307 BG 3	Brooklyn	1
CT 309 BG 1	Brooklyn	1
CT 309 BG 2	Brooklyn	3
CT 31 BG 1	Brooklyn	3
CT 31 BG 2	Brooklyn	3
CT 31 BG 3	Brooklyn	3
CT 311 BG 1	Brooklyn	1
CT 311 BG 2	Brooklyn	1
CT 311 BG 3	Brooklyn	3
CT 313 BG 1	Brooklyn	1
CT 313 BG 2	Brooklyn	3
CT 313 BG 3	Brooklyn	1
CT 313 BG 4	Brooklyn	3
CT 314 BG 4	Brooklyn	3
CT 315 BG 1	Brooklyn	3
CT 315 BG 2	Brooklyn	3
CT 315 BG 3	Brooklyn	3
CT 315 BG 4	Brooklyn	3
CT 317.01 BG 1	Brooklyn	3
CT 317.01 BG 2	Brooklyn	1
CT 317.01 BG 3	Brooklyn	3
CT 317.02 BG 1	Brooklyn	1
CT 317.02 BG 2	Brooklyn	3
CT 317.02 BG 3	Brooklyn	3
CT 319 BG 1	Brooklyn	1
CT 319 BG 2	Brooklyn	2
CT 319 BG 3	Brooklyn	1
CT 321 BG 1	Brooklyn	1
CT 321 BG 2	Brooklyn	3
CT 321 BG 3	Brooklyn	3
CT 321 BG 4	Brooklyn	3
CT 323 BG 1	Brooklyn	3
CT 323 BG 2	Brooklyn	3
CT 323 BG 3	Brooklyn	3
CT 325 BG 1	Brooklyn	3
CT 325 BG 2	Brooklyn	1
CT 325 BG 3	Brooklyn	1
CT 326 BG 1	Brooklyn	1
CT 326 BG 2	Brooklyn	1
CT 326 BG 3	Brooklyn	1
CT 326 BG 4	Brooklyn	1
CT 326 BG 5	Brooklyn	1
CT 327 BG 1	Brooklyn	3
CT 327 BG 2	Brooklyn	3
CT 327 BG 3	Brooklyn	1
CT 328 BG 1	Brooklyn	3
CT 328 BG 2	Brooklyn	1
CT 328 BG 3	Brooklyn	1
CT 328 BG 4	Brooklyn	3
CT 329 BG 1	Brooklyn	2
CT 329 BG 2	Brooklyn	1
CT 329 BG 3	Brooklyn	1
CT 329 BG 4	Brooklyn	3
CT 33 BG 2	Brooklyn	3
CT 330 BG 1	Brooklyn	1
CT 330 BG 2	Brooklyn	3
CT 330 BG 3	Brooklyn	1
CT 331 BG 1	Brooklyn	2
CT 331 BG 2	Brooklyn	2
CT 333 BG 2	Brooklyn	2
CT 333 BG 3	Brooklyn	2
CT 335 BG 1	Brooklyn	2
CT 335 BG 2	Brooklyn	2
CT 335 BG 3	Brooklyn	2
CT 337 BG 1	Brooklyn	1
CT 337 BG 2	Brooklyn	2
CT 339 BG 1	Brooklyn	1
CT 339 BG 2	Brooklyn	1
CT 339 BG 3	Brooklyn	1
CT 339 BG 4	Brooklyn	3
CT 34 BG 2	Brooklyn	3
CT 340 BG 1	Brooklyn	1
CT 340 BG 2	Brooklyn	2
CT 341 BG 1	Brooklyn	3
CT 341 BG 2	Brooklyn	3
CT 341 BG 3	Brooklyn	1
CT 342 BG 1	Brooklyn	1
CT 342 BG 2	Brooklyn	1
CT 342 BG 3	Brooklyn	1
CT 342 BG 4	Brooklyn	2
CT 343 BG 1	Brooklyn	1
CT 343 BG 2	Brooklyn	3
CT 343 BG 3	Brooklyn	3
CT 345 BG 1	Brooklyn	1
CT 345 BG 2	Brooklyn	1
CT 347 BG 1	Brooklyn	1
CT 347 BG 2	Brooklyn	3
CT 347 BG 3	Brooklyn	1
CT 348 BG 1	Brooklyn	1
CT 348 BG 2	Brooklyn	1
CT 349 BG 1	Brooklyn	1
CT 349 BG 2	Brooklyn	1
CT 349 BG 3	Brooklyn	3
CT 349 BG 4	Brooklyn	1
CT 35 BG 2	Brooklyn	3
CT 350 BG 1	Brooklyn	2
CT 351 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 351 BG 2	Brooklyn	1
CT 351 BG 3	Brooklyn	1
CT 352 BG 1	Brooklyn	2
CT 353 BG 1	Brooklyn	1
CT 353 BG 2	Brooklyn	1
CT 353 BG 3	Brooklyn	3
CT 355 BG 1	Brooklyn	1
CT 355 BG 2	Brooklyn	1
CT 355 BG 3	Brooklyn	1
CT 356.02 BG 1	Brooklyn	2
CT 357 BG 1	Brooklyn	1
CT 359 BG 1	Brooklyn	1
CT 359 BG 2	Brooklyn	1
CT 359 BG 3	Brooklyn	1
CT 359 BG 4	Brooklyn	1
CT 360.01 BG 1	Brooklyn	2
CT 360.01 BG 2	Brooklyn	2
CT 360.01 BG 3	Brooklyn	2
CT 360.02 BG 1	Brooklyn	2
CT 360.02 BG 2	Brooklyn	2
CT 361 BG 1	Brooklyn	1
CT 361 BG 2	Brooklyn	1
CT 361 BG 3	Brooklyn	1
CT 362 BG 1	Brooklyn	2
CT 362 BG 2	Brooklyn	1
CT 363 BG 1	Brooklyn	1
CT 363 BG 2	Brooklyn	1
CT 363 BG 3	Brooklyn	1
CT 363 BG 4	Brooklyn	1
CT 364 BG 1	Brooklyn	2
CT 365.01 BG 1	Brooklyn	1
CT 365.01 BG 2	Brooklyn	3
CT 365.02 BG 1	Brooklyn	1
CT 366 BG 1	Brooklyn	1
CT 366 BG 2	Brooklyn	2
CT 366 BG 3	Brooklyn	1
CT 367 BG 1	Brooklyn	3
CT 367 BG 2	Brooklyn	3
CT 369 BG 1	Brooklyn	1
CT 369 BG 2	Brooklyn	1
CT 369 BG 3	Brooklyn	1
CT 369 BG 4	Brooklyn	1
CT 370 BG 1	Brooklyn	2
CT 370 BG 3	Brooklyn	3
CT 371 BG 1	Brooklyn	3
CT 371 BG 2	Brooklyn	3
CT 371 BG 3	Brooklyn	3
CT 371 BG 4	Brooklyn	1
CT 371 BG 5	Brooklyn	1
CT 373 BG 1	Brooklyn	1
CT 373 BG 2	Brooklyn	1
CT 373 BG 3	Brooklyn	1
CT 373 BG 4	Brooklyn	1
CT 374.01 BG 2	Brooklyn	2

Census Tract & Block Group ID	Place Name	Category
CT 374.02 BG 1	Brooklyn	1
CT 374.02 BG 2	Brooklyn	2
CT 374.02 BG 3	Brooklyn	2
CT 374.02 BG 4	Brooklyn	2
CT 375 BG 1	Brooklyn	3
CT 375 BG 2	Brooklyn	1
CT 375 BG 3	Brooklyn	3
CT 377 BG 1	Brooklyn	1
CT 377 BG 2	Brooklyn	1
CT 377 BG 3	Brooklyn	3
CT 377 BG 4	Brooklyn	3
CT 379 BG 1	Brooklyn	3
CT 379 BG 2	Brooklyn	1
CT 379 BG 3	Brooklyn	3
CT 381 BG 1	Brooklyn	3
CT 381 BG 2	Brooklyn	1
CT 381 BG 3	Brooklyn	3
CT 381 BG 4	Brooklyn	1
CT 382 BG 1	Brooklyn	1
CT 382 BG 2	Brooklyn	1
CT 382 BG 3	Brooklyn	1
CT 383 BG 1	Brooklyn	3
CT 383 BG 2	Brooklyn	1
CT 383 BG 3	Brooklyn	3
CT 383 BG 4	Brooklyn	3
CT 385 BG 1	Brooklyn	3
CT 385 BG 2	Brooklyn	3
CT 385 BG 3	Brooklyn	1
CT 385 BG 4	Brooklyn	3
CT 386 BG 1	Brooklyn	3
CT 386 BG 2	Brooklyn	3
CT 387 BG 1	Brooklyn	3
CT 387 BG 2	Brooklyn	1
CT 387 BG 3	Brooklyn	1
CT 387 BG 4	Brooklyn	3
CT 388 BG 3	Brooklyn	2
CT 389 BG 1	Brooklyn	3
CT 389 BG 2	Brooklyn	3
CT 389 BG 3	Brooklyn	1
CT 39 BG 1	Brooklyn	3
CT 390 BG 1	Brooklyn	2
CT 391 BG 1	Brooklyn	1
CT 391 BG 2	Brooklyn	1
CT 393 BG 1	Brooklyn	3
CT 393 BG 2	Brooklyn	3
CT 393 BG 3	Brooklyn	1
CT 394 BG 1	Brooklyn	2
CT 394 BG 2	Brooklyn	2
CT 395 BG 1	Brooklyn	3
CT 395 BG 2	Brooklyn	1
CT 395 BG 3	Brooklyn	1
CT 396 BG 2	Brooklyn	2
CT 397 BG 1	Brooklyn	1
CT 397 BG 2	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 397 BG 3	Brooklyn	1
CT 398 BG 1	Brooklyn	3
CT 398 BG 2	Brooklyn	1
CT 399 BG 1	Brooklyn	1
CT 399 BG 2	Brooklyn	3
CT 399 BG 3	Brooklyn	1
CT 400 BG 2	Brooklyn	3
CT 400 BG 3	Brooklyn	1
CT 401 BG 1	Brooklyn	1
CT 401 BG 2	Brooklyn	1
CT 401 BG 3	Brooklyn	1
CT 402 BG 1	Brooklyn	3
CT 402 BG 2	Brooklyn	1
CT 403 BG 1	Brooklyn	1
CT 403 BG 2	Brooklyn	3
CT 403 BG 3	Brooklyn	1
CT 404 BG 1	Brooklyn	3
CT 404 BG 2	Brooklyn	1
CT 405 BG 1	Brooklyn	1
CT 405 BG 2	Brooklyn	1
CT 406 BG 1	Brooklyn	1
CT 406 BG 2	Brooklyn	1
CT 406 BG 3	Brooklyn	3
CT 408 BG 1	Brooklyn	3
CT 408 BG 2	Brooklyn	3
CT 408 BG 3	Brooklyn	3
CT 409 BG 1	Brooklyn	1
CT 409 BG 2	Brooklyn	3
CT 409 BG 3	Brooklyn	1
CT 410 BG 1	Brooklyn	2
CT 410 BG 2	Brooklyn	2
CT 411 BG 1	Brooklyn	1
CT 411 BG 2	Brooklyn	1
CT 411 BG 3	Brooklyn	3
CT 412 BG 1	Brooklyn	2
CT 413 BG 1	Brooklyn	1
CT 413 BG 2	Brooklyn	3
CT 413 BG 3	Brooklyn	1
CT 414.01 BG 1	Brooklyn	2
CT 414.02 BG 2	Brooklyn	2
CT 415 BG 1	Brooklyn	3
CT 415 BG 2	Brooklyn	3
CT 415 BG 3	Brooklyn	1
CT 416 BG 1	Brooklyn	2
CT 416 BG 2	Brooklyn	2
CT 417 BG 1	Brooklyn	1
CT 417 BG 2	Brooklyn	1
CT 417 BG 3	Brooklyn	1
CT 417 BG 4	Brooklyn	1
CT 418 BG 1	Brooklyn	2
CT 418 BG 2	Brooklyn	2
CT 419 BG 1	Brooklyn	1
CT 419 BG 2	Brooklyn	1
CT 419 BG 3	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 420 BG 1	Brooklyn	2
CT 421 BG 1	Brooklyn	1
CT 421 BG 2	Brooklyn	1
CT 421 BG 3	Brooklyn	1
CT 421 BG 4	Brooklyn	3
CT 422 BG 1	Brooklyn	2
CT 423 BG 1	Brooklyn	1
CT 423 BG 3	Brooklyn	3
CT 424 BG 1	Brooklyn	3
CT 424 BG 3	Brooklyn	1
CT 425 BG 1	Brooklyn	3
CT 425 BG 2	Brooklyn	3
CT 425 BG 3	Brooklyn	3
CT 426 BG 1	Brooklyn	1
CT 426 BG 2	Brooklyn	1
CT 426 BG 3	Brooklyn	3
CT 427 BG 1	Brooklyn	1
CT 427 BG 2	Brooklyn	1
CT 427 BG 3	Brooklyn	1
CT 427 BG 4	Brooklyn	1
CT 428 BG 1	Brooklyn	1
CT 429 BG 1	Brooklyn	1
CT 429 BG 2	Brooklyn	1
CT 429 BG 3	Brooklyn	3
CT 429 BG 4	Brooklyn	1
CT 43 BG 1	Brooklyn	3
CT 430 BG 2	Brooklyn	1
CT 430 BG 3	Brooklyn	1
CT 431 BG 1	Brooklyn	1
CT 431 BG 2	Brooklyn	3
CT 431 BG 3	Brooklyn	1
CT 431 BG 4	Brooklyn	1
CT 432 BG 1	Brooklyn	3
CT 432 BG 2	Brooklyn	1
CT 432 BG 3	Brooklyn	3
CT 433 BG 1	Brooklyn	1
CT 433 BG 2	Brooklyn	3
CT 433 BG 3	Brooklyn	1
CT 434 BG 1	Brooklyn	2
CT 434 BG 3	Brooklyn	1
CT 435 BG 1	Brooklyn	1
CT 435 BG 2	Brooklyn	3
CT 435 BG 3	Brooklyn	1
CT 436 BG 2	Brooklyn	1
CT 437 BG 1	Brooklyn	1
CT 437 BG 2	Brooklyn	3
CT 437 BG 3	Brooklyn	1
CT 437 BG 4	Brooklyn	1
CT 438 BG 1	Brooklyn	2
CT 438 BG 2	Brooklyn	2
CT 439 BG 1	Brooklyn	1
CT 439 BG 2	Brooklyn	1
CT 439 BG 3	Brooklyn	1
CT 440 BG 3	Brooklyn	2

Census Tract & Block Group ID	Place Name	Category
CT 441 BG 1	Brooklyn	1
CT 441 BG 2	Brooklyn	1
CT 441 BG 3	Brooklyn	3
CT 442 BG 2	Brooklyn	2
CT 443 BG 1	Brooklyn	1
CT 443 BG 2	Brooklyn	3
CT 443 BG 3	Brooklyn	3
CT 443 BG 4	Brooklyn	1
CT 444 BG 3	Brooklyn	2
CT 445 BG 1	Brooklyn	3
CT 445 BG 2	Brooklyn	1
CT 445 BG 3	Brooklyn	1
CT 446 BG 1	Brooklyn	3
CT 446 BG 2	Brooklyn	3
CT 447 BG 1	Brooklyn	1
CT 447 BG 2	Brooklyn	1
CT 448 BG 2	Brooklyn	2
CT 449 BG 1	Brooklyn	1
CT 449 BG 2	Brooklyn	1
CT 449 BG 4	Brooklyn	2
CT 450 BG 1	Brooklyn	2
CT 453 BG 1	Brooklyn	1
CT 453 BG 2	Brooklyn	2
CT 454 BG 1	Brooklyn	2
CT 456 BG 1	Brooklyn	2
CT 460 BG 2	Brooklyn	1
CT 460 BG 3	Brooklyn	1
CT 462.01 BG 1	Brooklyn	2
CT 462.01 BG 2	Brooklyn	2
CT 462.02 BG 1	Brooklyn	2
CT 462.02 BG 2	Brooklyn	2
CT 464 BG 1	Brooklyn	2
CT 464 BG 2	Brooklyn	2
CT 468 BG 1	Brooklyn	2
CT 470 BG 1	Brooklyn	2
CT 470 BG 2	Brooklyn	2
CT 472 BG 1	Brooklyn	2
CT 472 BG 2	Brooklyn	2
CT 474 BG 1	Brooklyn	2
CT 476 BG 1	Brooklyn	2
CT 476 BG 2	Brooklyn	2
CT 476 BG 3	Brooklyn	2
CT 478 BG 1	Brooklyn	2
CT 478 BG 3	Brooklyn	2
CT 480 BG 1	Brooklyn	2
CT 480 BG 2	Brooklyn	2
CT 482 BG 1	Brooklyn	1
CT 482 BG 2	Brooklyn	1
CT 482 BG 3	Brooklyn	1
CT 482 BG 4	Brooklyn	2
CT 484 BG 1	Brooklyn	2
CT 484 BG 2	Brooklyn	2
CT 484 BG 3	Brooklyn	2
CT 485 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 486 BG 1	Brooklyn	1
CT 486 BG 2	Brooklyn	1
CT 486 BG 3	Brooklyn	1
CT 488 BG 2	Brooklyn	1
CT 489 BG 1	Brooklyn	1
CT 489 BG 2	Brooklyn	1
CT 489 BG 3	Brooklyn	1
CT 49 BG 1	Brooklyn	3
CT 490 BG 1	Brooklyn	3
CT 490 BG 3	Brooklyn	2
CT 491 BG 1	Brooklyn	3
CT 491 BG 2	Brooklyn	3
CT 491 BG 3	Brooklyn	1
CT 491 BG 4	Brooklyn	1
CT 492 BG 1	Brooklyn	1
CT 492 BG 2	Brooklyn	3
CT 492 BG 3	Brooklyn	2
CT 493 BG 1	Brooklyn	1
CT 493 BG 4	Brooklyn	1
CT 493 BG 5	Brooklyn	1
CT 494 BG 1	Brooklyn	3
CT 494 BG 2	Brooklyn	1
CT 494 BG 3	Brooklyn	2
CT 495 BG 3	Brooklyn	3
CT 496 BG 1	Brooklyn	1
CT 496 BG 2	Brooklyn	3
CT 496 BG 3	Brooklyn	3
CT 498 BG 1	Brooklyn	3
CT 498 BG 2	Brooklyn	3
CT 498 BG 3	Brooklyn	3
CT 500 BG 3	Brooklyn	3
CT 503 BG 2	Brooklyn	1
CT 504 BG 3	Brooklyn	1
CT 505 BG 1	Brooklyn	1
CT 505 BG 3	Brooklyn	1
CT 506 BG 1	Brooklyn	1
CT 506 BG 2	Brooklyn	3
CT 506 BG 3	Brooklyn	1
CT 506 BG 4	Brooklyn	3
CT 507 BG 1	Brooklyn	2
CT 508.01 BG 1	Brooklyn	3
CT 508.01 BG 2	Brooklyn	1
CT 508.03 BG 1	Brooklyn	1
CT 508.04 BG 1	Brooklyn	3
CT 508.04 BG 2	Brooklyn	3
CT 508.04 BG 3	Brooklyn	1
CT 509 BG 1	Brooklyn	2
CT 509 BG 2	Brooklyn	2
CT 510.01 BG 1	Brooklyn	1
CT 510.01 BG 2	Brooklyn	1
CT 510.02 BG 1	Brooklyn	3
CT 510.02 BG 2	Brooklyn	1
CT 510.02 BG 3	Brooklyn	1
CT 511 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 511 BG 3	Brooklyn	1
CT 512 BG 1	Brooklyn	3
CT 512 BG 2	Brooklyn	3
CT 512 BG 3	Brooklyn	1
CT 512 BG 4	Brooklyn	3
CT 513 BG 2	Brooklyn	1
CT 513 BG 3	Brooklyn	3
CT 513 BG 4	Brooklyn	1
CT 514 BG 1	Brooklyn	3
CT 514 BG 2	Brooklyn	1
CT 514 BG 3	Brooklyn	3
CT 514 BG 4	Brooklyn	1
CT 516.01 BG 1	Brooklyn	3
CT 516.01 BG 2	Brooklyn	3
CT 516.01 BG 3	Brooklyn	1
CT 516.02 BG 1	Brooklyn	3
CT 516.02 BG 2	Brooklyn	3
CT 518 BG 1	Brooklyn	3
CT 518 BG 2	Brooklyn	3
CT 518 BG 3	Brooklyn	1
CT 520 BG 1	Brooklyn	3
CT 520 BG 2	Brooklyn	1
CT 520 BG 3	Brooklyn	1
CT 523 BG 1	Brooklyn	1
CT 523 BG 2	Brooklyn	1
CT 523 BG 3	Brooklyn	2
CT 523 BG 4	Brooklyn	1
CT 523 BG 5	Brooklyn	1
CT 525 BG 1	Brooklyn	2
CT 525 BG 2	Brooklyn	2
CT 526 BG 1	Brooklyn	3
CT 526 BG 3	Brooklyn	1
CT 527 BG 1	Brooklyn	3
CT 527 BG 3	Brooklyn	1
CT 527 BG 4	Brooklyn	1
CT 527 BG 5	Brooklyn	3
CT 527 BG 6	Brooklyn	3
CT 527 BG 7	Brooklyn	1
CT 528 BG 2	Brooklyn	3
CT 529 BG 2	Brooklyn	2
CT 529 BG 3	Brooklyn	2
CT 53 BG 2	Brooklyn	3
CT 530 BG 1	Brooklyn	1
CT 530 BG 2	Brooklyn	2
CT 530 BG 3	Brooklyn	2
CT 531 BG 1	Brooklyn	2
CT 531 BG 2	Brooklyn	2
CT 531 BG 3	Brooklyn	2
CT 531 BG 4	Brooklyn	2
CT 532 BG 1	Brooklyn	3
CT 533 BG 1	Brooklyn	2
CT 533 BG 2	Brooklyn	2
CT 533 BG 3	Brooklyn	2
CT 533 BG 4	Brooklyn	2
CT 533 BG 5	Brooklyn	2
CT 534 BG 1	Brooklyn	2
CT 534 BG 2	Brooklyn	2
CT 534 BG 3	Brooklyn	2
CT 534 BG 4	Brooklyn	1
CT 535 BG 1	Brooklyn	2
CT 535 BG 2	Brooklyn	2
CT 535 BG 3	Brooklyn	2
CT 535 BG 4	Brooklyn	2
CT 537 BG 1	Brooklyn	2
CT 537 BG 2	Brooklyn	2
CT 538 BG 1	Brooklyn	2
CT 538 BG 3	Brooklyn	2
CT 539 BG 1	Brooklyn	2
CT 539 BG 2	Brooklyn	2
CT 542 BG 1	Brooklyn	2
CT 542 BG 2	Brooklyn	2
CT 542 BG 3	Brooklyn	2
CT 543 BG 2	Brooklyn	3
CT 544 BG 1	Brooklyn	2
CT 544 BG 2	Brooklyn	3
CT 544 BG 3	Brooklyn	2
CT 545 BG 1	Brooklyn	2
CT 545 BG 2	Brooklyn	2
CT 545 BG 3	Brooklyn	2
CT 545 BG 5	Brooklyn	1
CT 545 BG 6	Brooklyn	2
CT 546 BG 2	Brooklyn	2
CT 546 BG 3	Brooklyn	2
CT 547 BG 1	Brooklyn	2
CT 547 BG 2	Brooklyn	2
CT 547 BG 3	Brooklyn	2
CT 551 BG 1	Brooklyn	3
CT 551 BG 2	Brooklyn	1
CT 551 BG 4	Brooklyn	3
CT 552 BG 2	Brooklyn	2
CT 553 BG 2	Brooklyn	3
CT 554 BG 1	Brooklyn	2
CT 554 BG 2	Brooklyn	2
CT 554 BG 3	Brooklyn	1
CT 556 BG 1	Brooklyn	2
CT 556 BG 2	Brooklyn	2
CT 556 BG 3	Brooklyn	3
CT 560 BG 2	Brooklyn	2
CT 562 BG 2	Brooklyn	2
CT 563 BG 2	Brooklyn	2
CT 566 BG 1	Brooklyn	3
CT 566 BG 2	Brooklyn	3
CT 570 BG 4	Brooklyn	3
CT 572 BG 1	Brooklyn	1
CT 572 BG 2	Brooklyn	1
CT 574 BG 1	Brooklyn	3
CT 574 BG 2	Brooklyn	3
CT 576 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 576 BG 2	Brooklyn	3
CT 578 BG 1	Brooklyn	1
CT 578 BG 2	Brooklyn	3
CT 579 BG 1	Brooklyn	3
CT 579 BG 2	Brooklyn	1
CT 58 BG 3	Brooklyn	1
CT 580 BG 1	Brooklyn	1
CT 580 BG 2	Brooklyn	3
CT 582 BG 1	Brooklyn	3
CT 582 BG 2	Brooklyn	1
CT 582 BG 3	Brooklyn	2
CT 586 BG 1	Brooklyn	1
CT 586 BG 2	Brooklyn	3
CT 590 BG 1	Brooklyn	1
CT 592 BG 2	Brooklyn	3
CT 594.01 BG 1	Brooklyn	3
CT 594.01 BG 2	Brooklyn	2
CT 594.01 BG 4	Brooklyn	3
CT 594.01 BG 5	Brooklyn	2
CT 598 BG 1	Brooklyn	2
CT 60 BG 1	Brooklyn	3
CT 60 BG 2	Brooklyn	3
CT 606 BG 2	Brooklyn	3
CT 608 BG 1	Brooklyn	2
CT 608 BG 2	Brooklyn	2
CT 610.03 BG 1	Brooklyn	3
CT 610.03 BG 2	Brooklyn	1
CT 610.04 BG 1	Brooklyn	2
CT 610.04 BG 2	Brooklyn	2
CT 610.04 BG 4	Brooklyn	2
CT 610.04 BG 5	Brooklyn	2
CT 62 BG 2	Brooklyn	2
CT 626 BG 1	Brooklyn	3
CT 626 BG 2	Brooklyn	1
CT 650 BG 1	Brooklyn	3
CT 650 BG 2	Brooklyn	1
CT 66 BG 2	Brooklyn	2
CT 670 BG 1	Brooklyn	3
CT 670 BG 2	Brooklyn	3
CT 672 BG 1	Brooklyn	3
CT 674 BG 1	Brooklyn	1
CT 674 BG 2	Brooklyn	3
CT 676 BG 1	Brooklyn	3
CT 676 BG 2	Brooklyn	3
CT 678 BG 1	Brooklyn	3
CT 678 BG 2	Brooklyn	3
CT 68 BG 1	Brooklyn	1
CT 68 BG 2	Brooklyn	2
CT 68 BG 4	Brooklyn	1
CT 680 BG 1	Brooklyn	3
CT 680 BG 2	Brooklyn	3
CT 682 BG 1	Brooklyn	3
CT 682 BG 2	Brooklyn	3
CT 686 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 688 BG 1	Brooklyn	3
CT 688 BG 2	Brooklyn	3
CT 690 BG 1	Brooklyn	3
CT 690 BG 2	Brooklyn	3
CT 692 BG 1	Brooklyn	3
CT 692 BG 2	Brooklyn	3
CT 696.01 BG 2	Brooklyn	3
CT 696.02 BG 2	Brooklyn	3
CT 70 BG 1	Brooklyn	3
CT 71 BG 2	Brooklyn	3
CT 71 BG 3	Brooklyn	1
CT 71 BG 4	Brooklyn	1
CT 72 BG 1	Brooklyn	1
CT 720 BG 1	Brooklyn	3
CT 722 BG 1	Brooklyn	3
CT 722 BG 2	Brooklyn	3
CT 724 BG 1	Brooklyn	3
CT 724 BG 2	Brooklyn	3
CT 726 BG 1	Brooklyn	3
CT 728 BG 1	Brooklyn	3
CT 728 BG 2	Brooklyn	3
CT 730 BG 1	Brooklyn	3
CT 730 BG 2	Brooklyn	3
CT 732 BG 1	Brooklyn	3
CT 732 BG 2	Brooklyn	3
CT 734 BG 1	Brooklyn	3
CT 734 BG 2	Brooklyn	3
CT 736 BG 1	Brooklyn	1
CT 736 BG 2	Brooklyn	3
CT 736 BG 3	Brooklyn	1
CT 738 BG 1	Brooklyn	1
CT 738 BG 2	Brooklyn	3
CT 738 BG 3	Brooklyn	1
CT 74 BG 1	Brooklyn	1
CT 74 BG 2	Brooklyn	1
CT 74 BG 3	Brooklyn	1
CT 74 BG 4	Brooklyn	1
CT 740 BG 1	Brooklyn	3
CT 740 BG 2	Brooklyn	3
CT 742 BG 1	Brooklyn	3
CT 742 BG 2	Brooklyn	3
CT 76 BG 1	Brooklyn	1
CT 76 BG 2	Brooklyn	1
CT 76 BG 3	Brooklyn	1
CT 762 BG 1	Brooklyn	1
CT 762 BG 2	Brooklyn	1
CT 762 BG 3	Brooklyn	2
CT 764 BG 1	Brooklyn	3
CT 764 BG 2	Brooklyn	1
CT 764 BG 3	Brooklyn	3
CT 766 BG 1	Brooklyn	3
CT 768 BG 1	Brooklyn	2
CT 768 BG 2	Brooklyn	2
CT 770 BG 1	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 770 BG 2	Brooklyn	1
CT 772 BG 1	Brooklyn	3
CT 774 BG 1	Brooklyn	1
CT 774 BG 2	Brooklyn	3
CT 776 BG 1	Brooklyn	3
CT 776 BG 2	Brooklyn	3
CT 776 BG 3	Brooklyn	3
CT 78 BG 1	Brooklyn	1
CT 78 BG 2	Brooklyn	1
CT 78 BG 3	Brooklyn	1
CT 78 BG 4	Brooklyn	1
CT 780 BG 1	Brooklyn	3
CT 780 BG 2	Brooklyn	3
CT 782 BG 1	Brooklyn	3
CT 782 BG 2	Brooklyn	1
CT 784 BG 1	Brooklyn	3
CT 784 BG 2	Brooklyn	3
CT 786 BG 1	Brooklyn	1
CT 786 BG 2	Brooklyn	1
CT 786 BG 3	Brooklyn	3
CT 788 BG 1	Brooklyn	1
CT 788 BG 2	Brooklyn	1
CT 788 BG 3	Brooklyn	3
CT 790 BG 1	Brooklyn	3
CT 790 BG 2	Brooklyn	1
CT 790 BG 3	Brooklyn	3
CT 790 BG 4	Brooklyn	3
CT 792 BG 1	Brooklyn	1
CT 792 BG 2	Brooklyn	3
CT 792 BG 3	Brooklyn	1
CT 794 BG 1	Brooklyn	1
CT 794 BG 2	Brooklyn	1
CT 796.01 BG 1	Brooklyn	3
CT 796.01 BG 2	Brooklyn	3
CT 796.02 BG 1	Brooklyn	1
CT 796.02 BG 2	Brooklyn	3
CT 798.01 BG 1	Brooklyn	3
CT 798.01 BG 2	Brooklyn	3
CT 798.02 BG 1	Brooklyn	1
CT 798.02 BG 2	Brooklyn	3
CT 798.02 BG 3	Brooklyn	3
CT 80 BG 1	Brooklyn	3
CT 80 BG 2	Brooklyn	3
CT 80 BG 3	Brooklyn	1
CT 800 BG 1	Brooklyn	3
CT 800 BG 2	Brooklyn	3
CT 800 BG 3	Brooklyn	3
CT 802 BG 1	Brooklyn	1
CT 802 BG 2	Brooklyn	3
CT 802 BG 3	Brooklyn	3
CT 804 BG 1	Brooklyn	1
CT 804 BG 2	Brooklyn	3
CT 804 BG 3	Brooklyn	3
CT 806 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 806 BG 2	Brooklyn	3
CT 808 BG 1	Brooklyn	1
CT 810 BG 1	Brooklyn	3
CT 810 BG 2	Brooklyn	1
CT 814 BG 1	Brooklyn	1
CT 814 BG 2	Brooklyn	3
CT 816 BG 1	Brooklyn	3
CT 816 BG 2	Brooklyn	1
CT 818 BG 1	Brooklyn	3
CT 818 BG 2	Brooklyn	3
CT 818 BG 3	Brooklyn	3
CT 82 BG 1	Brooklyn	3
CT 82 BG 2	Brooklyn	1
CT 82 BG 3	Brooklyn	1
CT 820 BG 1	Brooklyn	1
CT 820 BG 2	Brooklyn	1
CT 820 BG 3	Brooklyn	1
CT 822 BG 1	Brooklyn	3
CT 822 BG 2	Brooklyn	1
CT 822 BG 3	Brooklyn	1
CT 822 BG 4	Brooklyn	1
CT 824 BG 1	Brooklyn	1
CT 824 BG 2	Brooklyn	3
CT 824 BG 3	Brooklyn	3
CT 824 BG 4	Brooklyn	3
CT 826 BG 1	Brooklyn	3
CT 826 BG 2	Brooklyn	3
CT 826 BG 3	Brooklyn	3
CT 826 BG 4	Brooklyn	3
CT 828 BG 1	Brooklyn	1
CT 828 BG 2	Brooklyn	3
CT 828 BG 3	Brooklyn	3
CT 830 BG 1	Brooklyn	3
CT 830 BG 2	Brooklyn	3
CT 830 BG 3	Brooklyn	3
CT 830 BG 4	Brooklyn	1
CT 832 BG 1	Brooklyn	3
CT 832 BG 2	Brooklyn	3
CT 834 BG 1	Brooklyn	3
CT 834 BG 2	Brooklyn	3
CT 836 BG 1	Brooklyn	3
CT 836 BG 2	Brooklyn	3
CT 838 BG 1	Brooklyn	3
CT 838 BG 2	Brooklyn	3
CT 84 BG 1	Brooklyn	1
CT 84 BG 2	Brooklyn	1
CT 84 BG 3	Brooklyn	1
CT 840 BG 1	Brooklyn	3
CT 840 BG 2	Brooklyn	3
CT 846 BG 1	Brooklyn	3
CT 846 BG 2	Brooklyn	3
CT 848 BG 1	Brooklyn	3
CT 848 BG 2	Brooklyn	3
CT 85 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 85 BG 2	Brooklyn	1
CT 85 BG 3	Brooklyn	1
CT 850 BG 1	Brooklyn	3
CT 854 BG 1	Brooklyn	1
CT 854 BG 2	Brooklyn	3
CT 856 BG 1	Brooklyn	3
CT 856 BG 2	Brooklyn	3
CT 856 BG 3	Brooklyn	3
CT 858 BG 1	Brooklyn	3
CT 858 BG 2	Brooklyn	3
CT 860 BG 1	Brooklyn	1
CT 860 BG 2	Brooklyn	3
CT 860 BG 3	Brooklyn	3
CT 862 BG 1	Brooklyn	3
CT 862 BG 2	Brooklyn	1
CT 862 BG 3	Brooklyn	1
CT 864 BG 1	Brooklyn	3
CT 864 BG 2	Brooklyn	3
CT 866 BG 1	Brooklyn	3
CT 866 BG 2	Brooklyn	1
CT 866 BG 3	Brooklyn	3
CT 868 BG 1	Brooklyn	3
CT 868 BG 2	Brooklyn	1
CT 868 BG 3	Brooklyn	1
CT 870 BG 1	Brooklyn	1
CT 870 BG 2	Brooklyn	1
CT 870 BG 3	Brooklyn	3
CT 872 BG 1	Brooklyn	1
CT 872 BG 2	Brooklyn	3
CT 872 BG 3	Brooklyn	1
CT 874.01 BG 1	Brooklyn	1
CT 874.01 BG 2	Brooklyn	1
CT 876 BG 1	Brooklyn	1
CT 876 BG 2	Brooklyn	3
CT 878 BG 1	Brooklyn	1
CT 878 BG 2	Brooklyn	3
CT 878 BG 3	Brooklyn	3
CT 88 BG 1	Brooklyn	3
CT 88 BG 2	Brooklyn	3
CT 880 BG 1	Brooklyn	3
CT 880 BG 2	Brooklyn	3
CT 880 BG 3	Brooklyn	3
CT 882 BG 1	Brooklyn	3
CT 882 BG 2	Brooklyn	3
CT 882 BG 3	Brooklyn	3
CT 882 BG 4	Brooklyn	3
CT 884 BG 1	Brooklyn	1
CT 884 BG 2	Brooklyn	3
CT 884 BG 3	Brooklyn	1
CT 886 BG 1	Brooklyn	1
CT 886 BG 2	Brooklyn	1
CT 886 BG 3	Brooklyn	1
CT 888 BG 1	Brooklyn	1
CT 888 BG 2	Brooklyn	3
CT 888 BG 3	Brooklyn	1
CT 890 BG 1	Brooklyn	1
CT 890 BG 2	Brooklyn	1
CT 890 BG 3	Brooklyn	1
CT 890 BG 4	Brooklyn	1
CT 890 BG 5	Brooklyn	3
CT 890 BG 6	Brooklyn	1
CT 892 BG 1	Brooklyn	3
CT 892 BG 2	Brooklyn	1
CT 892 BG 3	Brooklyn	1
CT 892 BG 4	Brooklyn	1
CT 894 BG 1	Brooklyn	3
CT 894 BG 2	Brooklyn	1
CT 894 BG 3	Brooklyn	1
CT 894 BG 4	Brooklyn	1
CT 896 BG 1	Brooklyn	3
CT 896 BG 2	Brooklyn	3
CT 896 BG 3	Brooklyn	1
CT 898 BG 1	Brooklyn	3
CT 898 BG 2	Brooklyn	1
CT 90 BG 1	Brooklyn	1
CT 90 BG 2	Brooklyn	1
CT 900 BG 1	Brooklyn	3
CT 900 BG 2	Brooklyn	1
CT 900 BG 3	Brooklyn	1
CT 900 BG 4	Brooklyn	1
CT 900 BG 5	Brooklyn	1
CT 900 BG 6	Brooklyn	1
CT 900 BG 7	Brooklyn	1
CT 902 BG 1	Brooklyn	1
CT 902 BG 2	Brooklyn	1
CT 902 BG 3	Brooklyn	1
CT 902 BG 4	Brooklyn	3
CT 902 BG 5	Brooklyn	1
CT 906 BG 1	Brooklyn	1
CT 906 BG 2	Brooklyn	1
CT 906 BG 3	Brooklyn	1
CT 908 BG 1	Brooklyn	1
CT 908 BG 2	Brooklyn	1
CT 908 BG 3	Brooklyn	1
CT 910 BG 1	Brooklyn	1
CT 910 BG 2	Brooklyn	1
CT 910 BG 3	Brooklyn	1
CT 910 BG 4	Brooklyn	1
CT 912 BG 1	Brooklyn	1
CT 912 BG 2	Brooklyn	1
CT 912 BG 3	Brooklyn	1
CT 916 BG 1	Brooklyn	1
CT 916 BG 2	Brooklyn	1
CT 916 BG 3	Brooklyn	3
CT 916 BG 4	Brooklyn	1
CT 918 BG 1	Brooklyn	1
CT 918 BG 2	Brooklyn	3
CT 92 BG 1	Brooklyn	1

Census Tract & Block Group ID	Place Name	Category
CT 92 BG 2	Brooklyn	1
CT 92 BG 3	Brooklyn	1
CT 920 BG 1	Brooklyn	1
CT 920 BG 2	Brooklyn	1
CT 920 BG 3	Brooklyn	3
CT 922 BG 1	Brooklyn	3
CT 922 BG 2	Brooklyn	1
CT 924 BG 1	Brooklyn	1
CT 924 BG 2	Brooklyn	1
CT 924 BG 3	Brooklyn	1
CT 928 BG 1	Brooklyn	3
CT 928 BG 2	Brooklyn	3
CT 930 BG 1	Brooklyn	3
CT 930 BG 2	Brooklyn	3
CT 932 BG 1	Brooklyn	3
CT 934 BG 1	Brooklyn	3
CT 934 BG 2	Brooklyn	3
CT 936 BG 1	Brooklyn	3
CT 936 BG 2	Brooklyn	3
CT 938 BG 1	Brooklyn	3
CT 938 BG 2	Brooklyn	3
CT 94 BG 1	Brooklyn	1
CT 94 BG 2	Brooklyn	1
CT 94 BG 3	Brooklyn	1
CT 944.01 BG 1	Brooklyn	3
CT 944.01 BG 2	Brooklyn	3
CT 944.01 BG 3	Brooklyn	3
CT 944.01 BG 4	Brooklyn	3
CT 944.02 BG 1	Brooklyn	1
CT 946 BG 1	Brooklyn	3
CT 946 BG 2	Brooklyn	3
CT 946 BG 3	Brooklyn	3
CT 950 BG 1	Brooklyn	3
CT 950 BG 2	Brooklyn	3
CT 954 BG 1	Brooklyn	3
CT 954 BG 2	Brooklyn	3
CT 954 BG 3	Brooklyn	3

Census Tract & Block Group ID	Place Name	Category
CT 956 BG 1	Brooklyn	3
CT 956 BG 2	Brooklyn	3
CT 958 BG 1	Brooklyn	3
CT 958 BG 2	Brooklyn	3
CT 96 BG 1	Brooklyn	1
CT 96 BG 2	Brooklyn	1
CT 96 BG 3	Brooklyn	1
CT 96 BG 4	Brooklyn	1
CT 962 BG 1	Brooklyn	3
CT 964 BG 1	Brooklyn	3
CT 964 BG 2	Brooklyn	3
CT 966 BG 1	Brooklyn	3
CT 966 BG 2	Brooklyn	3
CT 968 BG 1	Brooklyn	3
CT 968 BG 2	Brooklyn	3
CT 970 BG 1	Brooklyn	3
CT 970 BG 2	Brooklyn	3
CT 974 BG 1	Brooklyn	1
CT 974 BG 2	Brooklyn	3
CT 98 BG 1	Brooklyn	1
CT 98 BG 2	Brooklyn	1
CT 98 BG 3	Brooklyn	1
CT 98 BG 4	Brooklyn	1
CT 982 BG 1	Brooklyn	1
CT 982 BG 2	Brooklyn	1
CT 984 BG 1	Brooklyn	3
CT 986 BG 1	Brooklyn	3
CT 986 BG 2	Brooklyn	3
CT 988 BG 1	Brooklyn	3
CT 988 BG 2	Brooklyn	3
CT 990 BG 1	Brooklyn	3
CT 992 BG 1	Brooklyn	3
CT 994 BG 1	Brooklyn	3
CT 996 BG 1	Brooklyn	3
CT 996 BG 2	Brooklyn	3
CT 998 BG 1	Brooklyn	3
CT 998 BG 2	Brooklyn	3

Table G-EJ15. Census Tracts (CT) and Block Groups (BG) in Richmond County, New York (County ID 36-085) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 105 BG 1	Staten Island	1
CT 105 BG 4	Staten Island	1
CT 105 BG 5	Staten Island	3
CT 11 BG 1	Staten Island	1
CT 11 BG 2	Staten Island	1
CT 11 BG 3	Staten Island	1

Census Tract & Block Group ID	Place Name	Category
CT 112.01 BG 2	Staten Island	2
CT 112.02 BG 2	Staten Island	1
CT 112.02 BG 3	Staten Island	3
CT 112.02 BG 4	Staten Island	1
CT 114.01 BG 2	Staten Island	1
CT 121 BG 2	Staten Island	1

Census Tract & Block Group ID	Place Name	Category
CT 125 BG 1	Staten Island	1
CT 125 BG 2	Staten Island	1
CT 128.04 BG 2	Staten Island	2
CT 128.05 BG 1	Staten Island	2
CT 128.06 BG 2	Staten Island	2
CT 128.06 BG 3	Staten Island	1
CT 132.03 BG 2	Staten Island	1
CT 132.04 BG 3	Staten Island	2
CT 133.01 BG 1	Staten Island	1
CT 133.02 BG 1	Staten Island	1
CT 133.02 BG 2	Staten Island	1
CT 133.02 BG 3	Staten Island	1
CT 134 BG 1	Staten Island	1
CT 138 BG 3	Staten Island	2
CT 138 BG 4	Staten Island	2
CT 141 BG 1	Staten Island	3
CT 141 BG 2	Staten Island	3
CT 146.04 BG 2	Staten Island	2
CT 151 BG 1	Staten Island	1
CT 151 BG 2	Staten Island	2
CT 151 BG 3	Staten Island	3
CT 156.02 BG 1	Staten Island	2
CT 156.03 BG 1	Staten Island	2
CT 156.03 BG 2	Staten Island	2
CT 169.01 BG 2	Staten Island	2
CT 17 BG 1	Staten Island	1
CT 17 BG 2	Staten Island	1
CT 170.07 BG 2	Staten Island	3
CT 170.09 BG 1	Staten Island	2
CT 170.1 BG 2	Staten Island	2
CT 170.1 BG 3	Staten Island	2
CT 170.12 BG 3	Staten Island	2
CT 173 BG 1	Staten Island	3
CT 173 BG 2	Staten Island	1
CT 176 BG 3	Staten Island	2
CT 181 BG 1	Staten Island	2
CT 187.01 BG 1	Staten Island	3
CT 187.02 BG 1	Staten Island	3
CT 187.02 BG 3	Staten Island	3
CT 187.02 BG 4	Staten Island	1
CT 189.01 BG 2	Staten Island	2
CT 189.02 BG 1	Staten Island	1
CT 189.02 BG 3	Staten Island	1
CT 198 BG 4	Staten Island	2
CT 20.01 BG 1	Staten Island	1
CT 20.02 BG 2	Staten Island	2
CT 201 BG 1	Staten Island	3
CT 201 BG 2	Staten Island	3
CT 207 BG 1	Staten Island	1
CT 207 BG 2	Staten Island	1
CT 207 BG 3	Staten Island	3
CT 207 BG 4	Staten Island	1
CT 208.01 BG 1	Staten Island	2
CT 208.01 BG 3	Staten Island	2

Census Tract & Block Group ID	Place Name	Category
CT 208.03 BG 1	Staten Island	2
CT 21 BG 1	Staten Island	1
CT 21 BG 2	Staten Island	3
CT 21 BG 3	Staten Island	1
CT 213 BG 1	Staten Island	1
CT 213 BG 2	Staten Island	1
CT 213 BG 3	Staten Island	1
CT 213 BG 4	Staten Island	1
CT 213 BG 5	Staten Island	1
CT 223 BG 1	Staten Island	1
CT 223 BG 2	Staten Island	1
CT 226 BG 1	Staten Island	2
CT 231 BG 1	Staten Island	1
CT 231 BG 2	Staten Island	1
CT 239 BG 1	Staten Island	1
CT 239 BG 2	Staten Island	1
CT 247 BG 1	Staten Island	1
CT 247 BG 2	Staten Island	3
CT 248 BG 3	Staten Island	2
CT 27 BG 1	Staten Island	1
CT 273.01 BG 1	Staten Island	1
CT 273.01 BG 2	Staten Island	3
CT 273.02 BG 2	Staten Island	2
CT 277.02 BG 2	Staten Island	1
CT 277.02 BG 3	Staten Island	3
CT 277.05 BG 1	Staten Island	2
CT 277.05 BG 2	Staten Island	2
CT 277.06 BG 1	Staten Island	3
CT 277.06 BG 2	Staten Island	1
CT 277.06 BG 3	Staten Island	3
CT 29 BG 1	Staten Island	1
CT 29 BG 2	Staten Island	1
CT 29 BG 3	Staten Island	1
CT 29 BG 4	Staten Island	3
CT 291.02 BG 1	Staten Island	3
CT 291.02 BG 2	Staten Island	3
CT 291.03 BG 1	Staten Island	2
CT 291.03 BG 3	Staten Island	1
CT 291.04 BG 1	Staten Island	3
CT 291.04 BG 4	Staten Island	1
CT 3 BG 1	Staten Island	1
CT 3 BG 2	Staten Island	1
CT 303.01 BG 1	Staten Island	3
CT 303.01 BG 2	Staten Island	3
CT 303.02 BG 1	Staten Island	3
CT 303.02 BG 2	Staten Island	3
CT 303.02 BG 3	Staten Island	1
CT 303.02 BG 4	Staten Island	3
CT 319.01 BG 1	Staten Island	1
CT 319.01 BG 2	Staten Island	3
CT 319.02 BG 1	Staten Island	1
CT 319.02 BG 2	Staten Island	1
CT 319.02 BG 3	Staten Island	1
CT 323 BG 1	Staten Island	1

Census Tract & Block Group ID	Place Name	Category
CT 33 BG 1	Staten Island	1
CT 33 BG 2	Staten Island	3
CT 36 BG 1	Staten Island	3
CT 36 BG 2	Staten Island	1
CT 39 BG 1	Staten Island	2
CT 39 BG 2	Staten Island	3
CT 40 BG 1	Staten Island	1
CT 40 BG 2	Staten Island	1
CT 40 BG 3	Staten Island	1
CT 40 BG 4	Staten Island	3
CT 40 BG 5	Staten Island	3
CT 40 BG 6	Staten Island	1
CT 40 BG 7	Staten Island	1
CT 50 BG 2	Staten Island	1
CT 50 BG 3	Staten Island	1
CT 59 BG 1	Staten Island	2
CT 59 BG 2	Staten Island	2
CT 6 BG 1	Staten Island	1
CT 6 BG 2	Staten Island	1
CT 64 BG 2	Staten Island	2
CT 64 BG 3	Staten Island	1
CT 7 BG 1	Staten Island	1
CT 7 BG 2	Staten Island	1

Census Tract & Block Group ID	Place Name	Category
CT 7 BG 3	Staten Island	1
CT 7 BG 4	Staten Island	1
CT 70 BG 1	Staten Island	2
CT 70 BG 2	Staten Island	3
CT 70 BG 3	Staten Island	2
CT 74 BG 1	Staten Island	1
CT 74 BG 2	Staten Island	1
CT 75 BG 1	Staten Island	1
CT 75 BG 2	Staten Island	3
CT 75 BG 3	Staten Island	1
CT 77 BG 1	Staten Island	1
CT 8 BG 1	Staten Island	1
CT 8 BG 2	Staten Island	1
CT 8 BG 3	Staten Island	3
CT 81 BG 1	Staten Island	1
CT 81 BG 2	Staten Island	3
CT 81 BG 3	Staten Island	1
CT 9 BG 1	Staten Island	1
CT 9 BG 2	Staten Island	1
CT 97 BG 1	Staten Island	1
CT 97 BG 2	Staten Island	3
CT 97 BG 3	Staten Island	3

Table G-EJ16. Census Tracts (CT) and Block Groups (BG) in Hudson County, New Jersey (County ID 34-017) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 1 BG 1	Jersey City	1
CT 1 BG 2	Jersey City	1
CT 1 BG 3	Jersey City	3
CT 10 BG 1	Jersey City	3
CT 10 BG 2	Jersey City	1
CT 101 BG 1	Bayonne	1
CT 101 BG 2	Bayonne	1
CT 101 BG 3	Bayonne	1
CT 101 BG 4	Bayonne	3
CT 102 BG 3	Bayonne	1
CT 103 BG 1	Bayonne	2
CT 103 BG 2	Bayonne	2
CT 103 BG 3	Bayonne	1
CT 104 BG 1	Bayonne	3
CT 104 BG 2	Bayonne	3
CT 104 BG 3	Bayonne	3
CT 105 BG 1	Bayonne	3
CT 105 BG 2	Bayonne	2
CT 105 BG 4	Bayonne	3
CT 106 BG 2	Bayonne	1
CT 106 BG 3	Bayonne	1

Census Tract & Block Group ID	Place Name	Category
CT 106 BG 4	Bayonne	1
CT 107 BG 2	Bayonne	1
CT 107 BG 3	Bayonne	2
CT 108 BG 1	Bayonne	3
CT 108 BG 2	Bayonne	3
CT 108 BG 3	Bayonne	2
CT 109 BG 1	Bayonne	1
CT 11 BG 1	Jersey City	3
CT 11 BG 2	Jersey City	3
CT 11 BG 3	Jersey City	3
CT 110 BG 1	Bayonne	1
CT 111 BG 1	Bayonne	1
CT 111 BG 2	Bayonne	1
CT 111 BG 3	Bayonne	1
CT 112 BG 1	Bayonne	2
CT 112 BG 2	Bayonne	3
CT 113 BG 1	Bayonne	1
CT 113 BG 2	Bayonne	1
CT 113 BG 3	Bayonne	3
CT 114 BG 1	Bayonne	3
CT 115 BG 1	Bayonne	3

Census Tract & Block Group ID	Place Name	Category
CT 116 BG 1	Bayonne	2
CT 116 BG 2	Bayonne	3
CT 116 BG 4	Bayonne	3
CT 12.01 BG 1	Jersey City	1
CT 12.02 BG 1	Jersey City	1
CT 123 BG 1	Kearny	3
CT 123 BG 2	Kearny	1
CT 125 BG 1	Kearny	3
CT 125 BG 3	Kearny	3
CT 126 BG 1	Kearny	3
CT 126 BG 2	Kearny	3
CT 126 BG 3	Kearny	1
CT 127 BG 1	Kearny	3
CT 127 BG 3	Kearny	3
CT 127 BG 5	Kearny	3
CT 128 BG 1	Kearny	3
CT 128 BG 2	Kearny	3
CT 128 BG 3	Kearny	1
CT 129 BG 1	Kearny	3
CT 129 BG 2	Kearny	1
CT 13 BG 1	Jersey City	1
CT 13 BG 2	Jersey City	1
CT 130 BG 1	Kearny	3
CT 130 BG 2	Kearny	1
CT 130 BG 3	Kearny	3
CT 131 BG 1	Kearny	1
CT 132 BG 1	Kearny	1
CT 132 BG 2	Kearny	1
CT 132 BG 3	Kearny	1
CT 133 BG 1	Kearny	3
CT 133 BG 2	Kearny	1
CT 133 BG 3	Kearny	3
CT 134 BG 1	East Newark	1
CT 134 BG 2	East Newark	1
CT 135 BG 1	Harrison	1
CT 135 BG 2	Harrison	1
CT 135 BG 3	Harrison	2
CT 136 BG 1	Harrison	1
CT 136 BG 2	Harrison	1
CT 137 BG 1	Harrison	1
CT 137 BG 2	Harrison	1
CT 138 BG 1	Harrison	3
CT 139 BG 1	Harrison	3
CT 139 BG 2	Harrison	3
CT 14 BG 1	Jersey City	1
CT 14 BG 2	Jersey City	1
CT 140 BG 1	North Bergen	1
CT 140 BG 2	North Bergen	3
CT 140 BG 3	North Bergen	3
CT 140 BG 4	North Bergen	1
CT 141.01 BG 1	North Bergen	3
CT 141.01 BG 2	North Bergen	3
CT 141.02 BG 1	North Bergen	3
CT 141.02 BG 2	North Bergen	3
CT 141.02 BG 3	North Bergen	3
CT 141.02 BG 4	North Bergen	3
CT 142 BG 1	North Bergen	1
CT 142 BG 2	North Bergen	3
CT 142 BG 3	North Bergen	1
CT 142 BG 4	North Bergen	1
CT 143 BG 1	North Bergen	3
CT 143 BG 2	North Bergen	3
CT 143 BG 3	North Bergen	1
CT 143 BG 4	North Bergen	3
CT 144 BG 1	North Bergen	3
CT 144 BG 2	North Bergen	3
CT 144 BG 3	North Bergen	3
CT 144 BG 4	North Bergen	3
CT 144 BG 5	North Bergen	1
CT 145.01 BG 1	North Bergen	1
CT 145.01 BG 2	North Bergen	1
CT 145.01 BG 3	North Bergen	1
CT 145.02 BG 1	North Bergen	1
CT 145.02 BG 2	North Bergen	1
CT 145.02 BG 3	North Bergen	1
CT 146 BG 1	North Bergen	3
CT 146 BG 2	North Bergen	3
CT 147 BG 1	North Bergen	1
CT 147 BG 2	North Bergen	3
CT 147 BG 3	North Bergen	1
CT 148 BG 1	North Bergen	3
CT 148 BG 2	North Bergen	1
CT 148 BG 3	North Bergen	1
CT 149 BG 1	North Bergen	3
CT 149 BG 2	North Bergen	3
CT 150.01 BG 1	Guttenberg	3
CT 150.02 BG 1	Guttenberg	1
CT 150.02 BG 2	Guttenberg	1
CT 150.02 BG 3	Guttenberg	1
CT 151 BG 1	Guttenberg	1
CT 151 BG 2	Guttenberg	3
CT 152.01 BG 1	West New York	3
CT 152.01 BG 2	West New York	3
CT 152.02 BG 1	West New York	1
CT 152.02 BG 2	West New York	3
CT 152.02 BG 3	West New York	1
CT 152.02 BG 4	West New York	1
CT 153 BG 1	West New York	1
CT 153 BG 2	West New York	1
CT 153 BG 3	West New York	1
CT 155 BG 1	West New York	3
CT 155 BG 2	West New York	1
CT 155 BG 3	West New York	1
CT 156 BG 1	West New York	1
CT 156 BG 2	West New York	1
CT 157 BG 1	West New York	1
CT 157 BG 2	West New York	1
CT 158.01 BG 1	West New York	3

Census Tract & Block Group ID	Place Name	Category
CT 158.01 BG 2	West New York	3
CT 158.02 BG 1	West New York	3
CT 158.02 BG 2	West New York	1
CT 158.02 BG 3	West New York	1
CT 159 BG 1	West New York	1
CT 159 BG 2	West New York	1
CT 159 BG 3	West New York	1
CT 159 BG 4	West New York	1
CT 160 BG 1	West New York	3
CT 160 BG 2	West New York	1
CT 161 BG 1	Union City	1
CT 161 BG 2	Union City	1
CT 162 BG 1	Union City	1
CT 162 BG 2	Union City	1
CT 162 BG 3	Union City	1
CT 163 BG 1	Union City	3
CT 163 BG 2	Union City	1
CT 163 BG 3	Union City	1
CT 164 BG 1	Union City	1
CT 164 BG 2	Union City	1
CT 164 BG 3	Union City	1
CT 165 BG 1	Union City	1
CT 165 BG 2	Union City	1
CT 165 BG 3	Union City	3
CT 166 BG 1	Union City	1
CT 166 BG 2	Union City	1
CT 167 BG 1	Union City	1
CT 168 BG 1	Union City	1
CT 168 BG 2	Union City	1
CT 168 BG 3	Union City	1
CT 169 BG 1	Union City	1
CT 169 BG 2	Union City	1
CT 17.01 BG 1	Jersey City	1
CT 17.01 BG 2	Jersey City	1
CT 170 BG 1	Union City	1
CT 170 BG 2	Union City	1
CT 170 BG 3	Union City	1
CT 171 BG 1	Union City	3
CT 171 BG 2	Union City	1
CT 171 BG 3	Union City	1
CT 171 BG 4	Union City	1
CT 172 BG 1	Union City	1
CT 172 BG 2	Union City	1
CT 173 BG 1	Union City	1
CT 174 BG 1	Union City	1
CT 174 BG 2	Union City	1
CT 175 BG 1	Union City	1
CT 175 BG 2	Union City	1
CT 176 BG 1	Union City	1
CT 176 BG 2	Union City	1
CT 177 BG 1	Union City	1
CT 177 BG 2	Union City	1
CT 178 BG 1	Union City	3
CT 178 BG 2	Union City	1
CT 178 BG 3	Union City	1
CT 178 BG 4	Union City	1
CT 18 BG 1	Jersey City	1
CT 18 BG 2	Jersey City	1
CT 180 BG 1	Weehawken	1
CT 180 BG 2	Weehawken	3
CT 181 BG 1	Weehawken	3
CT 181 BG 2	Weehawken	1
CT 182 BG 2	Weehawken	1
CT 184 BG 3	Hoboken	2
CT 185 BG 4	Hoboken	3
CT 187.02 BG 4	Hoboken	2
CT 19 BG 1	Jersey City	1
CT 190 BG 3	Hoboken	1
CT 190 BG 4	Hoboken	1
CT 193 BG 2	Hoboken	2
CT 198 BG 1	Secaucus	3
CT 199 BG 1	Secaucus	3
CT 199 BG 3	Secaucus	1
CT 2 BG 1	Jersey City	1
CT 2 BG 2	Jersey City	3
CT 2 BG 3	Jersey City	1
CT 20 BG 1	Jersey City	3
CT 20 BG 2	Jersey City	1
CT 20 BG 3	Jersey City	1
CT 200 BG 4	Secaucus	2
CT 201 BG 1	Secaucus	3
CT 22 BG 1	Jersey City	3
CT 23 BG 2	Jersey City	3
CT 27 BG 1	Jersey City	1
CT 27 BG 2	Jersey City	1
CT 27 BG 3	Jersey City	1
CT 28 BG 1	Jersey City	1
CT 28 BG 3	Jersey City	3
CT 28 BG 4	Jersey City	3
CT 28 BG 5	Jersey City	1
CT 29 BG 1	Jersey City	3
CT 29 BG 2	Jersey City	2
CT 29 BG 3	Jersey City	1
CT 3 BG 1	Jersey City	1
CT 3 BG 2	Jersey City	1
CT 3 BG 3	Jersey City	3
CT 30 BG 1	Jersey City	1
CT 30 BG 2	Jersey City	3
CT 31 BG 1	Jersey City	1
CT 31 BG 2	Jersey City	1
CT 31 BG 3	Jersey City	3
CT 324 BG 1	West New York	1
CT 324 BG 2	West New York	1
CT 324 BG 3	West New York	1
CT 324 BG 4	West New York	1
CT 35 BG 2	Jersey City	1
CT 4 BG 1	Jersey City	3
CT 4 BG 2	Jersey City	1

Census Tract & Block Group ID	Place Name	Category
CT 40 BG 1	Jersey City	3
CT 40 BG 2	Jersey City	3
CT 40 BG 3	Jersey City	3
CT 40 BG 4	Jersey City	3
CT 41.01 BG 1	Jersey City	3
CT 41.01 BG 2	Jersey City	3
CT 41.01 BG 3	Jersey City	1
CT 41.01 BG 4	Jersey City	3
CT 41.02 BG 1	Jersey City	1
CT 41.02 BG 2	Jersey City	3
CT 42 BG 1	Jersey City	1
CT 42 BG 2	Jersey City	1
CT 42 BG 3	Jersey City	3
CT 43 BG 1	Jersey City	3
CT 43 BG 2	Jersey City	1
CT 44 BG 1	Jersey City	1
CT 45 BG 1	Jersey City	1
CT 45 BG 2	Jersey City	1
CT 45 BG 3	Jersey City	1
CT 46 BG 1	Jersey City	1
CT 46 BG 2	Jersey City	1
CT 47 BG 1	Jersey City	3
CT 47 BG 2	Jersey City	1
CT 48 BG 1	Jersey City	1
CT 48 BG 2	Jersey City	1
CT 48 BG 3	Jersey City	1
CT 49 BG 1	Jersey City	3
CT 49 BG 2	Jersey City	1
CT 49 BG 3	Jersey City	1
CT 49 BG 4	Jersey City	3
CT 5 BG 1	Jersey City	1
CT 5 BG 2	Jersey City	1
CT 5 BG 3	Jersey City	1
CT 52 BG 1	Jersey City	1
CT 52 BG 2	Jersey City	3
CT 53 BG 1	Jersey City	1
CT 53 BG 2	Jersey City	1
CT 54 BG 1	Jersey City	3
CT 54 BG 2	Jersey City	1
CT 54 BG 3	Jersey City	1
CT 55 BG 1	Jersey City	1
CT 56 BG 1	Jersey City	1
CT 56 BG 2	Jersey City	3
CT 56 BG 3	Jersey City	3
CT 58.01 BG 1	Jersey City	1
CT 58.01 BG 2	Jersey City	1
CT 58.01 BG 3	Jersey City	1
CT 58.01 BG 4	Jersey City	1
CT 59 BG 1	Jersey City	3
CT 59 BG 2	Jersey City	3
CT 59 BG 3	Jersey City	3
CT 59 BG 4	Jersey City	3
CT 59 BG 5	Jersey City	1
CT 6 BG 1	Jersey City	3
CT 6 BG 2	Jersey City	1
CT 6 BG 3	Jersey City	1
CT 6 BG 4	Jersey City	3
CT 60 BG 1	Jersey City	1
CT 60 BG 2	Jersey City	1
CT 61 BG 1	Jersey City	3
CT 61 BG 2	Jersey City	1
CT 61 BG 3	Jersey City	1
CT 61 BG 4	Jersey City	3
CT 62 BG 1	Jersey City	1
CT 62 BG 2	Jersey City	1
CT 63 BG 1	Jersey City	1
CT 63 BG 2	Jersey City	3
CT 63 BG 3	Jersey City	1
CT 64 BG 1	Jersey City	3
CT 65 BG 1	Jersey City	1
CT 65 BG 2	Jersey City	1
CT 66 BG 1	Jersey City	3
CT 67 BG 1	Jersey City	1
CT 67 BG 2	Jersey City	1
CT 67 BG 3	Jersey City	1
CT 68 BG 1	Jersey City	3
CT 68 BG 2	Jersey City	1
CT 69 BG 1	Jersey City	2
CT 7 BG 2	Jersey City	1
CT 7 BG 3	Jersey City	3
CT 70 BG 1	Jersey City	1
CT 70 BG 2	Jersey City	3
CT 70 BG 3	Jersey City	3
CT 71 BG 1	Jersey City	1
CT 71 BG 2	Jersey City	3
CT 71 BG 3	Jersey City	1
CT 72 BG 2	Jersey City	3
CT 73 BG 1	Jersey City	3
CT 75 BG 1	Jersey City	3
CT 75 BG 2	Jersey City	3
CT 75 BG 4	Jersey City	3
CT 76 BG 1	Jersey City	3
CT 76 BG 2	Jersey City	3
CT 77 BG 2	Jersey City	3
CT 77 BG 3	Jersey City	3
CT 77 BG 4	Jersey City	3
CT 78 BG 1	Jersey City	1
CT 8 BG 1	Jersey City	1
CT 8 BG 2	Jersey City	1
CT 9.02 BG 1	Jersey City	3
CT 9.02 BG 2	Jersey City	3
CT 9.02 BG 3	Jersey City	3
CT 9.02 BG 4	Jersey City	1

Table G-EJ17. Census Tracts (CT) and Block Groups (BG) in Gloucester County, New Jersey (County ID 34-015) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 5001 BG 1	Westville	2
CT 5001 BG 2	Westville	2
CT 5001 BG 3	Westville	1
CT 5001 BG 4	Westville	1
CT 5002.01 BG 2	West Deptford	2
CT 5002.02 BG 2	West Deptford	2
CT 5002.02 BG 3	West Deptford	2
CT 5002.02 BG 4	West Deptford	1
CT 5002.03 BG 2	West Deptford	2
CT 5002.03 BG 3	West Deptford	2
CT 5002.04 BG 1	West Deptford	3
CT 5002.04 BG 3	West Deptford	3
CT 5002.05 BG 2	West Deptford	2
CT 5002.05 BG 3	West Deptford	2
CT 5003 BG 1	National Park	2
CT 5003 BG 3	National Park	2
CT 5004 BG 2	Paulsboro	1
CT 5004 BG 3	Paulsboro	1
CT 5004 BG 4	Paulsboro	1
CT 5004 BG 5	Paulsboro	1
CT 5004 BG 6	Paulsboro	1
CT 5004 BG 7	Paulsboro	2
CT 5005 BG 3	Greenwich	2
CT 5005 BG 4	Greenwich	2
CT 5005 BG 5	Greenwich	2
CT 5006 BG 1	East Greenwich	3
CT 5006 BG 2	East Greenwich	2
CT 5006 BG 3	East Greenwich	3
CT 5007.01 BG 1	Mantua	2
CT 5007.01 BG 2	Mantua	2
CT 5007.01 BG 3	Mantua	2
CT 5007.01 BG 5	Mantua	2
CT 5010.01 BG 1	Woodbury	3
CT 5010.01 BG 2	Woodbury	1
CT 5010.02 BG 1	Woodbury	1
CT 5010.02 BG 2	Woodbury	3
CT 5010.02 BG 3	Woodbury	1
CT 5010.03 BG 1	Woodbury	1
CT 5010.03 BG 2	Woodbury	3
CT 5010.03 BG 3	Woodbury	1
CT 5011.01 BG 1	Deptford	1
CT 5011.01 BG 2	Deptford	1
CT 5011.01 BG 3	Deptford	2
CT 5011.02 BG 1	Deptford	3
CT 5011.02 BG 2	Deptford	1
CT 5011.03 BG 2	Deptford	2
CT 5011.03 BG 3	Deptford	3
CT 5011.04 BG 1	Deptford	1
CT 5011.04 BG 3	Deptford	1
CT 5011.05 BG 1	Deptford	1
CT 5011.06 BG 1	Deptford	1
CT 5011.06 BG 2	Deptford	2
CT 5011.06 BG 3	Deptford	1
CT 5011.07 BG 2	Deptford	1
CT 5011.07 BG 3	Deptford	2
CT 5012.04 BG 1	Washington	2
CT 5012.05 BG 1	Washington	2
CT 5012.06 BG 2	Washington	1
CT 5012.06 BG 3	Washington	2
CT 5012.08 BG 3	Washington	2
CT 5012.09 BG 1	Washington	1
CT 5012.09 BG 3	Washington	3
CT 5012.12 BG 1	Washington	1
CT 5012.13 BG 3	Washington	3
CT 5013.01 BG 2	Pitman	2
CT 5013.01 BG 3	Pitman	2
CT 5013.02 BG 1	Pitman	2
CT 5013.03 BG 1	Pitman	3
CT 5013.03 BG 2	Pitman	2
CT 5013.03 BG 3	Pitman	2
CT 5014.02 BG 1	Glassboro	1
CT 5014.02 BG 2	Glassboro	2
CT 5014.02 BG 3	Glassboro	2
CT 5014.03 BG 2	Glassboro	1
CT 5014.04 BG 1	Glassboro	3
CT 5014.04 BG 2	Glassboro	2
CT 5014.05 BG 1	Glassboro	1
CT 5014.05 BG 2	Glassboro	1
CT 5014.06 BG 1	Glassboro	1
CT 5014.06 BG 2	Glassboro	2
CT 5015 BG 1	Clayton	1
CT 5015 BG 2	Clayton	2
CT 5015 BG 4	Clayton	1
CT 5015 BG 6	Clayton	3
CT 5016.03 BG 3	Monroe	1
CT 5016.04 BG 1	Monroe	2
CT 5016.04 BG 2	Monroe	2
CT 5016.04 BG 3	Monroe	3
CT 5016.04 BG 4	Monroe	1
CT 5016.04 BG 5	Monroe	1
CT 5016.05 BG 1	Monroe	3
CT 5016.05 BG 2	Monroe	1
CT 5016.05 BG 3	Monroe	2
CT 5016.06 BG 1	Monroe	3

Census Tract & Block Group ID	Place Name	Category
CT 5016.06 BG 2	Monroe	2
CT 5016.06 BG 4	Monroe	1
CT 5016.08 BG 1	Monroe	3
CT 5016.08 BG 2	Monroe	1
CT 5016.09 BG 1	Monroe	3
CT 5016.09 BG 2	Monroe	3
CT 5017.02 BG 1	Franklin	2
CT 5017.03 BG 3	Franklin	2
CT 5017.03 BG 4	Franklin	1
CT 5017.04 BG 1	Franklin	1
CT 5017.04 BG 2	Franklin	2
CT 5017.04 BG 3	Franklin	1
CT 5018 BG 1	Newfield	2
CT 5018 BG 2	Newfield	2
CT 5019 BG 2	Elk	1
CT 5019 BG 3	Elk	2
CT 5022 BG 2	Woolwich	3
CT 5023 BG 1	Swedesboro	1
CT 5023 BG 2	Swedesboro	1
CT 5024 BG 2	Logan	2
CT 5024 BG 3	Logan	3

Table G-EJ18. Census Tracts (CT) and Block Groups (BG) in Philadelphia County, Pennsylvania (County ID 42-101) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 100 BG 1	Philadelphia	1
CT 100 BG 2	Philadelphia	1
CT 100 BG 3	Philadelphia	3
CT 100 BG 4	Philadelphia	3
CT 101 BG 1	Philadelphia	3
CT 101 BG 2	Philadelphia	3
CT 101 BG 3	Philadelphia	1
CT 101 BG 4	Philadelphia	1
CT 101 BG 5	Philadelphia	1
CT 101 BG 6	Philadelphia	3
CT 101 BG 7	Philadelphia	1
CT 102 BG 1	Philadelphia	1
CT 102 BG 2	Philadelphia	1
CT 102 BG 3	Philadelphia	1
CT 103 BG 1	Philadelphia	1
CT 103 BG 2	Philadelphia	3
CT 104 BG 1	Philadelphia	1
CT 104 BG 2	Philadelphia	1
CT 104 BG 3	Philadelphia	1
CT 104 BG 4	Philadelphia	1
CT 105 BG 1	Philadelphia	1
CT 105 BG 2	Philadelphia	1
CT 105 BG 3	Philadelphia	1
CT 106 BG 1	Philadelphia	1
CT 106 BG 2	Philadelphia	1
CT 107 BG 1	Philadelphia	1
CT 107 BG 2	Philadelphia	1
CT 107 BG 3	Philadelphia	1
CT 107 BG 4	Philadelphia	1
CT 108 BG 1	Philadelphia	1
CT 108 BG 2	Philadelphia	3
CT 108 BG 3	Philadelphia	1
CT 108 BG 4	Philadelphia	1
CT 108 BG 5	Philadelphia	1
CT 109 BG 1	Philadelphia	1
CT 109 BG 2	Philadelphia	1
CT 109 BG 3	Philadelphia	1
CT 110 BG 1	Philadelphia	1
CT 110 BG 2	Philadelphia	1
CT 110 BG 3	Philadelphia	1
CT 110 BG 4	Philadelphia	1
CT 111 BG 1	Philadelphia	1
CT 111 BG 2	Philadelphia	1
CT 111 BG 3	Philadelphia	1
CT 111 BG 4	Philadelphia	1
CT 111 BG 5	Philadelphia	1
CT 112 BG 1	Philadelphia	1
CT 112 BG 2	Philadelphia	3
CT 112 BG 3	Philadelphia	1
CT 112 BG 4	Philadelphia	1
CT 112 BG 5	Philadelphia	1
CT 112 BG 6	Philadelphia	3
CT 112 BG 7	Philadelphia	1
CT 113 BG 1	Philadelphia	3
CT 113 BG 2	Philadelphia	1
CT 113 BG 3	Philadelphia	1
CT 114 BG 1	Philadelphia	3
CT 114 BG 2	Philadelphia	3
CT 114 BG 3	Philadelphia	1
CT 114 BG 4	Philadelphia	1
CT 114 BG 5	Philadelphia	3
CT 114 BG 6	Philadelphia	3
CT 115 BG 1	Philadelphia	3
CT 115 BG 2	Philadelphia	3
CT 115 BG 3	Philadelphia	3
CT 115 BG 4	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 117 BG 1	Philadelphia	3
CT 118 BG 1	Philadelphia	3
CT 118 BG 2	Philadelphia	1
CT 118 BG 3	Philadelphia	1
CT 118 BG 4	Philadelphia	3
CT 118 BG 5	Philadelphia	1
CT 118 BG 6	Philadelphia	3
CT 119 BG 1	Philadelphia	1
CT 119 BG 2	Philadelphia	1
CT 119 BG 3	Philadelphia	1
CT 119 BG 4	Philadelphia	3
CT 119 BG 5	Philadelphia	3
CT 120 BG 1	Philadelphia	3
CT 120 BG 2	Philadelphia	3
CT 121 BG 1	Philadelphia	3
CT 121 BG 2	Philadelphia	3
CT 122.01 BG 1	Philadelphia	1
CT 122.01 BG 2	Philadelphia	1
CT 122.03 BG 1	Philadelphia	1
CT 122.04 BG 1	Philadelphia	3
CT 122.04 BG 2	Philadelphia	3
CT 13 BG 3	Philadelphia	3
CT 13 BG 4	Philadelphia	3
CT 131 BG 1	Philadelphia	1
CT 131 BG 2	Philadelphia	3
CT 132 BG 1	Philadelphia	1
CT 132 BG 2	Philadelphia	1
CT 133 BG 2	Philadelphia	1
CT 135 BG 4	Philadelphia	3
CT 137 BG 1	Philadelphia	1
CT 137 BG 2	Philadelphia	1
CT 137 BG 3	Philadelphia	1
CT 137 BG 4	Philadelphia	3
CT 137 BG 5	Philadelphia	3
CT 138 BG 1	Philadelphia	1
CT 138 BG 2	Philadelphia	1
CT 139 BG 1	Philadelphia	1
CT 139 BG 2	Philadelphia	1
CT 139 BG 3	Philadelphia	3
CT 140 BG 1	Philadelphia	1
CT 140 BG 2	Philadelphia	1
CT 140 BG 3	Philadelphia	1
CT 141 BG 1	Philadelphia	1
CT 141 BG 2	Philadelphia	1
CT 144 BG 1	Philadelphia	1
CT 144 BG 3	Philadelphia	1
CT 145 BG 1	Philadelphia	1
CT 145 BG 2	Philadelphia	1
CT 146 BG 1	Philadelphia	1
CT 146 BG 2	Philadelphia	3
CT 146 BG 3	Philadelphia	1
CT 147 BG 1	Philadelphia	1
CT 147 BG 2	Philadelphia	1
CT 148 BG 1	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 149 BG 1	Philadelphia	1
CT 149 BG 2	Philadelphia	1
CT 149 BG 3	Philadelphia	1
CT 149 BG 4	Philadelphia	1
CT 149 BG 5	Philadelphia	1
CT 149 BG 6	Philadelphia	1
CT 151.01 BG 1	Philadelphia	1
CT 151.01 BG 2	Philadelphia	1
CT 151.02 BG 1	Philadelphia	1
CT 151.02 BG 2	Philadelphia	1
CT 151.02 BG 3	Philadelphia	1
CT 152 BG 1	Philadelphia	1
CT 152 BG 2	Philadelphia	1
CT 152 BG 3	Philadelphia	1
CT 152 BG 4	Philadelphia	1
CT 152 BG 5	Philadelphia	3
CT 153 BG 1	Philadelphia	2
CT 153 BG 2	Philadelphia	1
CT 153 BG 3	Philadelphia	1
CT 153 BG 4	Philadelphia	1
CT 156 BG 1	Philadelphia	1
CT 156 BG 2	Philadelphia	1
CT 157 BG 1	Philadelphia	3
CT 157 BG 2	Philadelphia	1
CT 157 BG 3	Philadelphia	1
CT 160 BG 2	Philadelphia	2
CT 160 BG 7	Philadelphia	2
CT 161 BG 2	Philadelphia	1
CT 161 BG 3	Philadelphia	3
CT 161 BG 4	Philadelphia	1
CT 162 BG 1	Philadelphia	1
CT 162 BG 2	Philadelphia	1
CT 162 BG 3	Philadelphia	1
CT 163 BG 1	Philadelphia	1
CT 163 BG 2	Philadelphia	1
CT 163 BG 3	Philadelphia	3
CT 163 BG 4	Philadelphia	1
CT 164 BG 1	Philadelphia	1
CT 164 BG 2	Philadelphia	1
CT 164 BG 3	Philadelphia	3
CT 164 BG 4	Philadelphia	1
CT 165 BG 1	Philadelphia	1
CT 165 BG 2	Philadelphia	1
CT 165 BG 3	Philadelphia	1
CT 166 BG 1	Philadelphia	1
CT 166 BG 2	Philadelphia	1
CT 167.01 BG 1	Philadelphia	1
CT 167.01 BG 2	Philadelphia	1
CT 167.01 BG 3	Philadelphia	1
CT 167.02 BG 1	Philadelphia	1
CT 167.02 BG 2	Philadelphia	1
CT 167.02 BG 3	Philadelphia	1
CT 167.02 BG 4	Philadelphia	1
CT 168 BG 1	Philadelphia	3

Census Tract & Block Group ID	Place Name	Category
CT 168 BG 2	Philadelphia	1
CT 168 BG 3	Philadelphia	1
CT 168 BG 4	Philadelphia	1
CT 168 BG 5	Philadelphia	1
CT 168 BG 6	Philadelphia	1
CT 169.01 BG 1	Philadelphia	1
CT 169.01 BG 2	Philadelphia	1
CT 169.01 BG 3	Philadelphia	1
CT 169.02 BG 1	Philadelphia	1
CT 169.02 BG 2	Philadelphia	1
CT 169.02 BG 3	Philadelphia	1
CT 169.02 BG 4	Philadelphia	1
CT 170 BG 1	Philadelphia	3
CT 170 BG 2	Philadelphia	1
CT 170 BG 3	Philadelphia	1
CT 171 BG 1	Philadelphia	1
CT 171 BG 2	Philadelphia	1
CT 171 BG 3	Philadelphia	3
CT 171 BG 4	Philadelphia	1
CT 172.01 BG 1	Philadelphia	1
CT 172.01 BG 2	Philadelphia	1
CT 172.01 BG 3	Philadelphia	3
CT 172.02 BG 1	Philadelphia	1
CT 172.02 BG 2	Philadelphia	1
CT 172.02 BG 3	Philadelphia	1
CT 172.02 BG 4	Philadelphia	1
CT 173 BG 1	Philadelphia	1
CT 173 BG 2	Philadelphia	1
CT 174 BG 1	Philadelphia	1
CT 174 BG 2	Philadelphia	1
CT 175 BG 1	Philadelphia	1
CT 175 BG 2	Philadelphia	1
CT 175 BG 3	Philadelphia	1
CT 175 BG 4	Philadelphia	1
CT 175 BG 5	Philadelphia	1
CT 175 BG 6	Philadelphia	1
CT 176.01 BG 1	Philadelphia	1
CT 176.01 BG 2	Philadelphia	1
CT 176.01 BG 3	Philadelphia	1
CT 176.01 BG 4	Philadelphia	1
CT 176.01 BG 5	Philadelphia	1
CT 176.02 BG 1	Philadelphia	1
CT 176.02 BG 2	Philadelphia	1
CT 176.02 BG 3	Philadelphia	1
CT 177.01 BG 1	Philadelphia	1
CT 177.01 BG 2	Philadelphia	1
CT 177.01 BG 3	Philadelphia	1
CT 177.02 BG 1	Philadelphia	1
CT 177.02 BG 2	Philadelphia	1
CT 177.02 BG 3	Philadelphia	1
CT 177.02 BG 4	Philadelphia	1
CT 177.02 BG 5	Philadelphia	1
CT 178 BG 1	Philadelphia	1
CT 178 BG 2	Philadelphia	1
CT 178 BG 3	Philadelphia	1
CT 178 BG 4	Philadelphia	1
CT 178 BG 5	Philadelphia	1
CT 178 BG 6	Philadelphia	1
CT 178 BG 7	Philadelphia	1
CT 179 BG 1	Philadelphia	1
CT 179 BG 2	Philadelphia	2
CT 179 BG 3	Philadelphia	1
CT 179 BG 4	Philadelphia	2
CT 179 BG 5	Philadelphia	1
CT 180.02 BG 1	Philadelphia	2
CT 180.02 BG 3	Philadelphia	2
CT 180.02 BG 4	Philadelphia	2
CT 188 BG 1	Philadelphia	1
CT 188 BG 2	Philadelphia	1
CT 188 BG 3	Philadelphia	1
CT 188 BG 4	Philadelphia	1
CT 188 BG 5	Philadelphia	1
CT 188 BG 6	Philadelphia	1
CT 188 BG 7	Philadelphia	1
CT 19 BG 3	Philadelphia	3
CT 190 BG 1	Philadelphia	1
CT 190 BG 2	Philadelphia	1
CT 190 BG 3	Philadelphia	1
CT 190 BG 4	Philadelphia	3
CT 190 BG 5	Philadelphia	1
CT 191 BG 1	Philadelphia	1
CT 191 BG 2	Philadelphia	1
CT 191 BG 3	Philadelphia	1
CT 191 BG 4	Philadelphia	3
CT 191 BG 5	Philadelphia	1
CT 191 BG 6	Philadelphia	1
CT 192 BG 1	Philadelphia	1
CT 192 BG 2	Philadelphia	1
CT 192 BG 3	Philadelphia	1
CT 192 BG 4	Philadelphia	1
CT 192 BG 5	Philadelphia	1
CT 192 BG 6	Philadelphia	1
CT 195.01 BG 1	Philadelphia	1
CT 195.01 BG 2	Philadelphia	1
CT 195.01 BG 3	Philadelphia	1
CT 195.02 BG 1	Philadelphia	1
CT 195.02 BG 2	Philadelphia	1
CT 195.02 BG 3	Philadelphia	1
CT 197 BG 1	Philadelphia	1
CT 197 BG 2	Philadelphia	1
CT 197 BG 3	Philadelphia	1
CT 197 BG 4	Philadelphia	1
CT 197 BG 5	Philadelphia	1
CT 197 BG 6	Philadelphia	1
CT 198 BG 1	Philadelphia	1
CT 198 BG 2	Philadelphia	1
CT 198 BG 3	Philadelphia	1
CT 198 BG 4	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 198 BG 5	Philadelphia	1
CT 198 BG 6	Philadelphia	1
CT 199 BG 1	Philadelphia	1
CT 199 BG 2	Philadelphia	1
CT 199 BG 3	Philadelphia	1
CT 199 BG 4	Philadelphia	1
CT 2 BG 1	Philadelphia	1
CT 20 BG 1	Philadelphia	1
CT 20 BG 2	Philadelphia	3
CT 200 BG 1	Philadelphia	1
CT 200 BG 2	Philadelphia	1
CT 201.01 BG 1	Philadelphia	1
CT 201.01 BG 2	Philadelphia	1
CT 201.01 BG 3	Philadelphia	1
CT 201.02 BG 1	Philadelphia	3
CT 201.02 BG 2	Philadelphia	3
CT 201.02 BG 3	Philadelphia	3
CT 201.02 BG 4	Philadelphia	3
CT 202 BG 1	Philadelphia	1
CT 202 BG 2	Philadelphia	1
CT 202 BG 3	Philadelphia	1
CT 202 BG 4	Philadelphia	1
CT 202 BG 5	Philadelphia	3
CT 202 BG 6	Philadelphia	1
CT 203 BG 1	Philadelphia	1
CT 203 BG 2	Philadelphia	1
CT 204 BG 1	Philadelphia	1
CT 204 BG 2	Philadelphia	1
CT 204 BG 3	Philadelphia	3
CT 204 BG 4	Philadelphia	1
CT 205 BG 1	Philadelphia	1
CT 205 BG 2	Philadelphia	1
CT 206 BG 1	Philadelphia	3
CT 207 BG 4	Philadelphia	3
CT 208 BG 1	Philadelphia	3
CT 21 BG 1	Philadelphia	1
CT 21 BG 2	Philadelphia	3
CT 213 BG 5	Philadelphia	2
CT 214 BG 3	Philadelphia	2
CT 218 BG 2	Philadelphia	1
CT 218 BG 3	Philadelphia	3
CT 22 BG 2	Philadelphia	3
CT 22 BG 3	Philadelphia	1
CT 236 BG 2	Philadelphia	3
CT 237 BG 1	Philadelphia	1
CT 237 BG 2	Philadelphia	3
CT 237 BG 3	Philadelphia	3
CT 237 BG 4	Philadelphia	3
CT 238 BG 1	Philadelphia	3
CT 238 BG 2	Philadelphia	3
CT 238 BG 3	Philadelphia	3
CT 238 BG 4	Philadelphia	3
CT 238 BG 5	Philadelphia	3
CT 239 BG 1	Philadelphia	1
CT 239 BG 2	Philadelphia	3
CT 24 BG 5	Philadelphia	3
CT 240 BG 1	Philadelphia	3
CT 240 BG 2	Philadelphia	3
CT 240 BG 3	Philadelphia	1
CT 240 BG 4	Philadelphia	1
CT 241 BG 1	Philadelphia	1
CT 242 BG 1	Philadelphia	3
CT 242 BG 2	Philadelphia	1
CT 242 BG 3	Philadelphia	1
CT 242 BG 4	Philadelphia	3
CT 243 BG 1	Philadelphia	1
CT 243 BG 2	Philadelphia	1
CT 243 BG 3	Philadelphia	3
CT 243 BG 4	Philadelphia	3
CT 244 BG 1	Philadelphia	1
CT 244 BG 2	Philadelphia	1
CT 244 BG 3	Philadelphia	1
CT 245 BG 1	Philadelphia	1
CT 245 BG 2	Philadelphia	1
CT 245 BG 3	Philadelphia	1
CT 245 BG 4	Philadelphia	1
CT 246 BG 1	Philadelphia	1
CT 246 BG 2	Philadelphia	1
CT 246 BG 3	Philadelphia	1
CT 247 BG 1	Philadelphia	1
CT 247 BG 2	Philadelphia	1
CT 247 BG 3	Philadelphia	3
CT 247 BG 4	Philadelphia	1
CT 247 BG 5	Philadelphia	3
CT 248 BG 1	Philadelphia	3
CT 248 BG 2	Philadelphia	1
CT 249 BG 1	Philadelphia	1
CT 249 BG 2	Philadelphia	1
CT 249 BG 3	Philadelphia	1
CT 249 BG 4	Philadelphia	1
CT 25 BG 3	Philadelphia	3
CT 25 BG 4	Philadelphia	1
CT 252 BG 1	Philadelphia	1
CT 252 BG 2	Philadelphia	1
CT 252 BG 3	Philadelphia	3
CT 252 BG 4	Philadelphia	3
CT 252 BG 5	Philadelphia	1
CT 252 BG 6	Philadelphia	1
CT 252 BG 7	Philadelphia	1
CT 253 BG 1	Philadelphia	1
CT 253 BG 2	Philadelphia	3
CT 253 BG 3	Philadelphia	3
CT 253 BG 4	Philadelphia	3
CT 253 BG 5	Philadelphia	1
CT 254 BG 1	Philadelphia	3
CT 254 BG 2	Philadelphia	3
CT 254 BG 3	Philadelphia	3
CT 254 BG 4	Philadelphia	3

Census Tract & Block Group ID	Place Name	Category
CT 255 BG 1	Philadelphia	3
CT 255 BG 2	Philadelphia	3
CT 255 BG 3	Philadelphia	3
CT 256 BG 1	Philadelphia	3
CT 257 BG 1	Philadelphia	3
CT 258 BG 1	Philadelphia	3
CT 259 BG 1	Philadelphia	3
CT 259 BG 2	Philadelphia	3
CT 259 BG 3	Philadelphia	1
CT 259 BG 4	Philadelphia	3
CT 259 BG 5	Philadelphia	3
CT 259 BG 6	Philadelphia	1
CT 260 BG 1	Philadelphia	3
CT 260 BG 2	Philadelphia	1
CT 260 BG 3	Philadelphia	3
CT 261 BG 1	Philadelphia	3
CT 261 BG 2	Philadelphia	1
CT 261 BG 3	Philadelphia	1
CT 262 BG 1	Philadelphia	3
CT 262 BG 2	Philadelphia	3
CT 262 BG 3	Philadelphia	3
CT 262 BG 4	Philadelphia	3
CT 263.01 BG 1	Philadelphia	3
CT 263.01 BG 2	Philadelphia	3
CT 263.01 BG 3	Philadelphia	3
CT 263.01 BG 4	Philadelphia	3
CT 263.02 BG 1	Philadelphia	3
CT 263.02 BG 2	Philadelphia	1
CT 263.02 BG 3	Philadelphia	3
CT 263.02 BG 4	Philadelphia	3
CT 264 BG 1	Philadelphia	3
CT 264 BG 2	Philadelphia	3
CT 264 BG 3	Philadelphia	1
CT 264 BG 4	Philadelphia	3
CT 264 BG 5	Philadelphia	3
CT 264 BG 6	Philadelphia	3
CT 264 BG 7	Philadelphia	3
CT 265 BG 1	Philadelphia	3
CT 265 BG 2	Philadelphia	1
CT 265 BG 3	Philadelphia	1
CT 265 BG 4	Philadelphia	1
CT 265 BG 5	Philadelphia	3
CT 265 BG 6	Philadelphia	3
CT 266 BG 1	Philadelphia	1
CT 266 BG 2	Philadelphia	1
CT 266 BG 3	Philadelphia	3
CT 266 BG 4	Philadelphia	1
CT 266 BG 5	Philadelphia	1
CT 266 BG 6	Philadelphia	3
CT 266 BG 7	Philadelphia	1
CT 266 BG 8	Philadelphia	3
CT 267 BG 1	Philadelphia	3
CT 267 BG 2	Philadelphia	3
CT 267 BG 3	Philadelphia	3
CT 267 BG 4	Philadelphia	1
CT 267 BG 5	Philadelphia	3
CT 267 BG 6	Philadelphia	3
CT 267 BG 7	Philadelphia	3
CT 268 BG 1	Philadelphia	1
CT 268 BG 2	Philadelphia	1
CT 268 BG 3	Philadelphia	3
CT 268 BG 4	Philadelphia	3
CT 269 BG 1	Philadelphia	3
CT 269 BG 2	Philadelphia	3
CT 27.01 BG 1	Philadelphia	3
CT 27.01 BG 2	Philadelphia	1
CT 27.01 BG 3	Philadelphia	1
CT 27.02 BG 3	Philadelphia	2
CT 270 BG 1	Philadelphia	3
CT 270 BG 2	Philadelphia	3
CT 271 BG 1	Philadelphia	3
CT 271 BG 2	Philadelphia	1
CT 271 BG 3	Philadelphia	3
CT 272 BG 1	Philadelphia	3
CT 272 BG 2	Philadelphia	3
CT 272 BG 3	Philadelphia	1
CT 273 BG 1	Philadelphia	3
CT 273 BG 2	Philadelphia	1
CT 273 BG 3	Philadelphia	1
CT 273 BG 4	Philadelphia	3
CT 273 BG 5	Philadelphia	3
CT 274.01 BG 1	Philadelphia	1
CT 274.01 BG 2	Philadelphia	1
CT 274.01 BG 3	Philadelphia	1
CT 274.02 BG 1	Philadelphia	3
CT 274.02 BG 2	Philadelphia	3
CT 274.02 BG 3	Philadelphia	3
CT 274.02 BG 4	Philadelphia	1
CT 274.02 BG 5	Philadelphia	1
CT 275 BG 1	Philadelphia	3
CT 275 BG 2	Philadelphia	3
CT 275 BG 3	Philadelphia	1
CT 275 BG 4	Philadelphia	1
CT 276 BG 1	Philadelphia	1
CT 276 BG 2	Philadelphia	3
CT 276 BG 3	Philadelphia	1
CT 276 BG 4	Philadelphia	1
CT 277 BG 1	Philadelphia	1
CT 277 BG 2	Philadelphia	1
CT 277 BG 3	Philadelphia	1
CT 277 BG 4	Philadelphia	3
CT 277 BG 5	Philadelphia	3
CT 277 BG 6	Philadelphia	1
CT 278 BG 1	Philadelphia	3
CT 278 BG 2	Philadelphia	1
CT 278 BG 3	Philadelphia	3
CT 278 BG 4	Philadelphia	1
CT 279.01 BG 1	Philadelphia	3

Census Tract & Block Group ID	Place Name	Category
CT 279.01 BG 2	Philadelphia	1
CT 279.01 BG 3	Philadelphia	3
CT 279.01 BG 4	Philadelphia	1
CT 279.02 BG 1	Philadelphia	1
CT 279.02 BG 2	Philadelphia	1
CT 28.01 BG 1	Philadelphia	1
CT 28.01 BG 2	Philadelphia	1
CT 28.01 BG 3	Philadelphia	3
CT 28.02 BG 1	Philadelphia	1
CT 280 BG 1	Philadelphia	1
CT 280 BG 2	Philadelphia	1
CT 280 BG 3	Philadelphia	1
CT 280 BG 4	Philadelphia	1
CT 281 BG 1	Philadelphia	3
CT 281 BG 2	Philadelphia	1
CT 281 BG 3	Philadelphia	1
CT 282 BG 1	Philadelphia	1
CT 282 BG 2	Philadelphia	1
CT 282 BG 3	Philadelphia	1
CT 283 BG 1	Philadelphia	1
CT 283 BG 2	Philadelphia	1
CT 283 BG 3	Philadelphia	3
CT 283 BG 4	Philadelphia	1
CT 283 BG 5	Philadelphia	3
CT 283 BG 6	Philadelphia	1
CT 283 BG 7	Philadelphia	1
CT 284 BG 1	Philadelphia	1
CT 284 BG 2	Philadelphia	1
CT 284 BG 3	Philadelphia	1
CT 284 BG 4	Philadelphia	3
CT 285 BG 1	Philadelphia	1
CT 286 BG 1	Philadelphia	1
CT 286 BG 2	Philadelphia	1
CT 286 BG 3	Philadelphia	1
CT 286 BG 4	Philadelphia	3
CT 286 BG 5	Philadelphia	1
CT 286 BG 6	Philadelphia	1
CT 287 BG 1	Philadelphia	1
CT 287 BG 2	Philadelphia	1
CT 288 BG 1	Philadelphia	1
CT 288 BG 2	Philadelphia	1
CT 288 BG 3	Philadelphia	1
CT 289.01 BG 1	Philadelphia	1
CT 289.01 BG 2	Philadelphia	1
CT 289.01 BG 3	Philadelphia	1
CT 289.02 BG 1	Philadelphia	1
CT 289.02 BG 2	Philadelphia	1
CT 289.02 BG 3	Philadelphia	1
CT 289.02 BG 4	Philadelphia	1
CT 289.02 BG 5	Philadelphia	1
CT 29 BG 1	Philadelphia	2
CT 290 BG 1	Philadelphia	1
CT 290 BG 2	Philadelphia	1
CT 290 BG 3	Philadelphia	1
CT 290 BG 4	Philadelphia	1
CT 291 BG 1	Philadelphia	1
CT 291 BG 2	Philadelphia	1
CT 291 BG 3	Philadelphia	1
CT 291 BG 4	Philadelphia	3
CT 292 BG 1	Philadelphia	3
CT 292 BG 2	Philadelphia	1
CT 292 BG 3	Philadelphia	3
CT 293 BG 1	Philadelphia	1
CT 293 BG 2	Philadelphia	1
CT 294 BG 1	Philadelphia	1
CT 294 BG 2	Philadelphia	1
CT 294 BG 3	Philadelphia	1
CT 298 BG 1	Philadelphia	1
CT 298 BG 2	Philadelphia	1
CT 298 BG 3	Philadelphia	3
CT 298 BG 4	Philadelphia	1
CT 298 BG 5	Philadelphia	1
CT 299 BG 1	Philadelphia	1
CT 299 BG 2	Philadelphia	1
CT 299 BG 3	Philadelphia	1
CT 299 BG 4	Philadelphia	1
CT 30.01 BG 1	Philadelphia	1
CT 30.01 BG 3	Philadelphia	3
CT 30.01 BG 4	Philadelphia	1
CT 30.01 BG 5	Philadelphia	1
CT 30.02 BG 1	Philadelphia	3
CT 30.02 BG 2	Philadelphia	1
CT 30.02 BG 3	Philadelphia	3
CT 30.02 BG 4	Philadelphia	1
CT 300 BG 1	Philadelphia	1
CT 300 BG 2	Philadelphia	1
CT 300 BG 3	Philadelphia	1
CT 300 BG 4	Philadelphia	1
CT 300 BG 5	Philadelphia	1
CT 300 BG 6	Philadelphia	1
CT 300 BG 7	Philadelphia	1
CT 301 BG 1	Philadelphia	1
CT 301 BG 2	Philadelphia	1
CT 301 BG 4	Philadelphia	3
CT 301 BG 5	Philadelphia	1
CT 302 BG 1	Philadelphia	1
CT 302 BG 2	Philadelphia	3
CT 302 BG 3	Philadelphia	3
CT 302 BG 4	Philadelphia	3
CT 302 BG 5	Philadelphia	1
CT 305.01 BG 1	Philadelphia	1
CT 305.01 BG 2	Philadelphia	1
CT 305.01 BG 3	Philadelphia	1
CT 305.02 BG 1	Philadelphia	3
CT 305.02 BG 2	Philadelphia	1
CT 305.02 BG 3	Philadelphia	1
CT 305.02 BG 4	Philadelphia	1
CT 305.02 BG 5	Philadelphia	3

Census Tract & Block Group ID	Place Name	Category
CT 306 BG 2	Philadelphia	3
CT 306 BG 3	Philadelphia	3
CT 306 BG 4	Philadelphia	3
CT 306 BG 5	Philadelphia	3
CT 306 BG 6	Philadelphia	3
CT 306 BG 7	Philadelphia	3
CT 307 BG 1	Philadelphia	1
CT 307 BG 2	Philadelphia	1
CT 307 BG 3	Philadelphia	3
CT 308 BG 3	Philadelphia	1
CT 308 BG 4	Philadelphia	3
CT 309 BG 1	Philadelphia	1
CT 309 BG 2	Philadelphia	1
CT 309 BG 3	Philadelphia	1
CT 31 BG 1	Philadelphia	3
CT 31 BG 2	Philadelphia	1
CT 31 BG 3	Philadelphia	1
CT 31 BG 4	Philadelphia	1
CT 31 BG 5	Philadelphia	1
CT 31 BG 6	Philadelphia	3
CT 310 BG 1	Philadelphia	3
CT 310 BG 2	Philadelphia	3
CT 310 BG 4	Philadelphia	3
CT 310 BG 5	Philadelphia	1
CT 310 BG 6	Philadelphia	3
CT 310 BG 7	Philadelphia	3
CT 311.01 BG 1	Philadelphia	1
CT 311.01 BG 2	Philadelphia	1
CT 311.01 BG 3	Philadelphia	3
CT 311.01 BG 4	Philadelphia	1
CT 311.02 BG 1	Philadelphia	3
CT 311.02 BG 2	Philadelphia	1
CT 311.02 BG 3	Philadelphia	1
CT 311.02 BG 4	Philadelphia	1
CT 312 BG 1	Philadelphia	1
CT 312 BG 2	Philadelphia	1
CT 312 BG 3	Philadelphia	1
CT 313 BG 1	Philadelphia	1
CT 313 BG 2	Philadelphia	1
CT 313 BG 3	Philadelphia	3
CT 313 BG 4	Philadelphia	1
CT 313 BG 5	Philadelphia	1
CT 313 BG 6	Philadelphia	1
CT 314.01 BG 1	Philadelphia	1
CT 314.01 BG 2	Philadelphia	1
CT 314.01 BG 3	Philadelphia	1
CT 314.01 BG 4	Philadelphia	1
CT 314.01 BG 5	Philadelphia	1
CT 314.02 BG 1	Philadelphia	1
CT 314.02 BG 2	Philadelphia	1
CT 314.02 BG 3	Philadelphia	1
CT 315.01 BG 3	Philadelphia	2
CT 315.02 BG 1	Philadelphia	1
CT 315.02 BG 2	Philadelphia	2

Census Tract & Block Group ID	Place Name	Category
CT 316 BG 2	Philadelphia	2
CT 316 BG 3	Philadelphia	1
CT 316 BG 5	Philadelphia	2
CT 316 BG 7	Philadelphia	3
CT 317 BG 1	Philadelphia	3
CT 317 BG 2	Philadelphia	3
CT 317 BG 3	Philadelphia	1
CT 317 BG 4	Philadelphia	3
CT 317 BG 5	Philadelphia	1
CT 318 BG 1	Philadelphia	3
CT 318 BG 2	Philadelphia	1
CT 318 BG 3	Philadelphia	1
CT 318 BG 4	Philadelphia	3
CT 319 BG 1	Philadelphia	1
CT 319 BG 2	Philadelphia	3
CT 319 BG 3	Philadelphia	2
CT 319 BG 4	Philadelphia	1
CT 319 BG 5	Philadelphia	3
CT 32 BG 1	Philadelphia	1
CT 32 BG 2	Philadelphia	1
CT 32 BG 3	Philadelphia	1
CT 32 BG 4	Philadelphia	1
CT 32 BG 5	Philadelphia	3
CT 32 BG 6	Philadelphia	1
CT 320 BG 1	Philadelphia	2
CT 320 BG 3	Philadelphia	3
CT 320 BG 4	Philadelphia	1
CT 320 BG 5	Philadelphia	3
CT 320 BG 6	Philadelphia	3
CT 320 BG 7	Philadelphia	2
CT 321 BG 1	Philadelphia	1
CT 321 BG 2	Philadelphia	1
CT 321 BG 3	Philadelphia	2
CT 323 BG 1	Philadelphia	1
CT 323 BG 2	Philadelphia	1
CT 325 BG 1	Philadelphia	3
CT 325 BG 3	Philadelphia	1
CT 325 BG 4	Philadelphia	2
CT 326 BG 1	Philadelphia	1
CT 326 BG 3	Philadelphia	3
CT 326 BG 4	Philadelphia	3
CT 326 BG 5	Philadelphia	3
CT 326 BG 6	Philadelphia	2
CT 329 BG 1	Philadelphia	1
CT 329 BG 3	Philadelphia	1
CT 329 BG 4	Philadelphia	2
CT 33 BG 1	Philadelphia	1
CT 33 BG 2	Philadelphia	1
CT 33 BG 3	Philadelphia	1
CT 33 BG 4	Philadelphia	1
CT 33 BG 5	Philadelphia	2
CT 33 BG 6	Philadelphia	1
CT 330 BG 1	Philadelphia	3
CT 330 BG 3	Philadelphia	2

Census Tract & Block Group ID	Place Name	Category
CT 330 BG 4	Philadelphia	1
CT 330 BG 6	Philadelphia	1
CT 331.02 BG 1	Philadelphia	2
CT 331.02 BG 2	Philadelphia	2
CT 334 BG 3	Philadelphia	1
CT 334 BG 4	Philadelphia	3
CT 335 BG 1	Philadelphia	1
CT 335 BG 2	Philadelphia	1
CT 335 BG 3	Philadelphia	3
CT 336 BG 2	Philadelphia	2
CT 336 BG 3	Philadelphia	2
CT 336 BG 4	Philadelphia	2
CT 337.01 BG 1	Philadelphia	1
CT 337.01 BG 3	Philadelphia	1
CT 337.02 BG 2	Philadelphia	2
CT 338 BG 1	Philadelphia	2
CT 338 BG 3	Philadelphia	2
CT 339 BG 2	Philadelphia	1
CT 340 BG 2	Philadelphia	3
CT 345.01 BG 1	Philadelphia	2
CT 345.02 BG 3	Philadelphia	1
CT 346 BG 1	Philadelphia	1
CT 347.01 BG 1	Philadelphia	3
CT 348.02 BG 1	Philadelphia	3
CT 349 BG 1	Philadelphia	3
CT 349 BG 2	Philadelphia	3
CT 349 BG 4	Philadelphia	2
CT 356.01 BG 4	Philadelphia	2
CT 357.01 BG 1	Philadelphia	2
CT 357.01 BG 2	Philadelphia	3
CT 357.02 BG 1	Philadelphia	2
CT 357.02 BG 2	Philadelphia	2
CT 358 BG 1	Philadelphia	3
CT 358 BG 3	Philadelphia	2
CT 36 BG 1	Philadelphia	3
CT 36 BG 2	Philadelphia	1
CT 36 BG 3	Philadelphia	1
CT 36 BG 4	Philadelphia	1
CT 361 BG 1	Philadelphia	3
CT 364 BG 1	Philadelphia	2
CT 365.01 BG 3	Philadelphia	3
CT 369 BG 3	Philadelphia	2
CT 37.01 BG 1	Philadelphia	1
CT 37.01 BG 2	Philadelphia	1
CT 37.01 BG 3	Philadelphia	1
CT 37.01 BG 4	Philadelphia	1
CT 37.01 BG 5	Philadelphia	3
CT 37.02 BG 1	Philadelphia	1
CT 37.02 BG 2	Philadelphia	1
CT 37.02 BG 3	Philadelphia	1
CT 372 BG 4	Philadelphia	1
CT 373 BG 3	Philadelphia	3
CT 375 BG 1	Philadelphia	3
CT 375 BG 2	Philadelphia	3

Census Tract & Block Group ID	Place Name	Category
CT 376 BG 1	Philadelphia	1
CT 377 BG 1	Philadelphia	1
CT 377 BG 2	Philadelphia	1
CT 377 BG 3	Philadelphia	1
CT 378 BG 2	Philadelphia	2
CT 380 BG 2	Philadelphia	2
CT 381 BG 1	Philadelphia	2
CT 381 BG 2	Philadelphia	1
CT 382 BG 1	Philadelphia	1
CT 382 BG 3	Philadelphia	1
CT 383 BG 1	Philadelphia	1
CT 383 BG 2	Philadelphia	1
CT 383 BG 3	Philadelphia	1
CT 389 BG 1	Philadelphia	1
CT 389 BG 2	Philadelphia	3
CT 389 BG 3	Philadelphia	1
CT 39.01 BG 1	Philadelphia	2
CT 39.01 BG 4	Philadelphia	3
CT 390 BG 1	Philadelphia	1
CT 390 BG 2	Philadelphia	3
CT 390 BG 3	Philadelphia	1
CT 390 BG 4	Philadelphia	1
CT 390 BG 5	Philadelphia	1
CT 390 BG 6	Philadelphia	3
CT 390 BG 7	Philadelphia	1
CT 390 BG 8	Philadelphia	1
CT 40.01 BG 3	Philadelphia	2
CT 41.01 BG 1	Philadelphia	1
CT 41.01 BG 2	Philadelphia	1
CT 41.01 BG 3	Philadelphia	1
CT 41.01 BG 4	Philadelphia	1
CT 41.02 BG 1	Philadelphia	1
CT 41.02 BG 2	Philadelphia	1
CT 41.02 BG 3	Philadelphia	2
CT 41.02 BG 4	Philadelphia	2
CT 42.02 BG 2	Philadelphia	1
CT 5 BG 1	Philadelphia	3
CT 54 BG 1	Philadelphia	3
CT 55 BG 1	Philadelphia	1
CT 55 BG 2	Philadelphia	3
CT 55 BG 3	Philadelphia	3
CT 56 BG 1	Philadelphia	1
CT 60 BG 1	Philadelphia	1
CT 60 BG 2	Philadelphia	1
CT 60 BG 3	Philadelphia	1
CT 60 BG 4	Philadelphia	1
CT 60 BG 5	Philadelphia	3
CT 61 BG 1	Philadelphia	1
CT 61 BG 2	Philadelphia	1
CT 62 BG 1	Philadelphia	3
CT 62 BG 2	Philadelphia	1
CT 62 BG 3	Philadelphia	1
CT 62 BG 4	Philadelphia	1
CT 63 BG 1	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 63 BG 2	Philadelphia	1
CT 63 BG 3	Philadelphia	1
CT 63 BG 4	Philadelphia	1
CT 64 BG 1	Philadelphia	1
CT 64 BG 2	Philadelphia	1
CT 64 BG 3	Philadelphia	1
CT 65 BG 1	Philadelphia	1
CT 65 BG 2	Philadelphia	1
CT 65 BG 3	Philadelphia	1
CT 65 BG 4	Philadelphia	1
CT 65 BG 5	Philadelphia	3
CT 65 BG 6	Philadelphia	1
CT 66 BG 1	Philadelphia	1
CT 66 BG 2	Philadelphia	1
CT 66 BG 3	Philadelphia	1
CT 66 BG 4	Philadelphia	1
CT 67 BG 1	Philadelphia	3
CT 67 BG 2	Philadelphia	3
CT 67 BG 3	Philadelphia	1
CT 67 BG 4	Philadelphia	1
CT 67 BG 5	Philadelphia	1
CT 67 BG 6	Philadelphia	3
CT 67 BG 7	Philadelphia	1
CT 69 BG 1	Philadelphia	1
CT 69 BG 2	Philadelphia	1
CT 69 BG 3	Philadelphia	1
CT 7 BG 3	Philadelphia	3
CT 70 BG 1	Philadelphia	1
CT 70 BG 2	Philadelphia	1
CT 70 BG 3	Philadelphia	1
CT 70 BG 4	Philadelphia	3
CT 70 BG 5	Philadelphia	1
CT 71.01 BG 1	Philadelphia	1
CT 71.01 BG 2	Philadelphia	1
CT 71.01 BG 3	Philadelphia	1
CT 71.02 BG 1	Philadelphia	1
CT 71.02 BG 2	Philadelphia	1
CT 71.02 BG 3	Philadelphia	1
CT 71.02 BG 4	Philadelphia	1
CT 71.02 BG 5	Philadelphia	1
CT 72 BG 1	Philadelphia	1
CT 72 BG 2	Philadelphia	1
CT 72 BG 3	Philadelphia	1
CT 72 BG 4	Philadelphia	1
CT 72 BG 5	Philadelphia	3
CT 72 BG 6	Philadelphia	1
CT 73 BG 1	Philadelphia	1
CT 73 BG 2	Philadelphia	1
CT 73 BG 3	Philadelphia	3
CT 73 BG 4	Philadelphia	1
CT 74 BG 1	Philadelphia	1
CT 74 BG 2	Philadelphia	1
CT 74 BG 3	Philadelphia	1
CT 74 BG 4	Philadelphia	1
CT 74 BG 5	Philadelphia	1
CT 77 BG 1	Philadelphia	1
CT 77 BG 2	Philadelphia	1
CT 78 BG 1	Philadelphia	1
CT 78 BG 2	Philadelphia	1
CT 78 BG 3	Philadelphia	1
CT 79 BG 1	Philadelphia	3
CT 79 BG 3	Philadelphia	3
CT 79 BG 4	Philadelphia	3
CT 80 BG 1	Philadelphia	3
CT 80 BG 2	Philadelphia	3
CT 80 BG 3	Philadelphia	3
CT 80 BG 4	Philadelphia	1
CT 81.01 BG 1	Philadelphia	1
CT 81.01 BG 2	Philadelphia	1
CT 81.01 BG 3	Philadelphia	1
CT 81.02 BG 1	Philadelphia	1
CT 81.02 BG 2	Philadelphia	1
CT 81.02 BG 3	Philadelphia	1
CT 81.02 BG 4	Philadelphia	1
CT 81.02 BG 5	Philadelphia	1
CT 82 BG 1	Philadelphia	1
CT 82 BG 2	Philadelphia	1
CT 82 BG 3	Philadelphia	1
CT 82 BG 4	Philadelphia	3
CT 82 BG 5	Philadelphia	3
CT 82 BG 6	Philadelphia	3
CT 82 BG 7	Philadelphia	1
CT 83.01 BG 1	Philadelphia	1
CT 83.01 BG 2	Philadelphia	3
CT 83.01 BG 3	Philadelphia	1
CT 83.02 BG 1	Philadelphia	1
CT 83.02 BG 2	Philadelphia	1
CT 83.02 BG 3	Philadelphia	1
CT 83.02 BG 4	Philadelphia	3
CT 84 BG 1	Philadelphia	1
CT 84 BG 2	Philadelphia	1
CT 84 BG 3	Philadelphia	3
CT 84 BG 4	Philadelphia	1
CT 84 BG 5	Philadelphia	1
CT 84 BG 6	Philadelphia	3
CT 85 BG 1	Philadelphia	1
CT 85 BG 2	Philadelphia	1
CT 85 BG 3	Philadelphia	3
CT 85 BG 4	Philadelphia	1
CT 85 BG 5	Philadelphia	1
CT 85 BG 6	Philadelphia	1
CT 85 BG 7	Philadelphia	1
CT 86.01 BG 1	Philadelphia	3
CT 86.02 BG 1	Philadelphia	1
CT 86.02 BG 2	Philadelphia	1
CT 86.02 BG 3	Philadelphia	3
CT 87.01 BG 2	Philadelphia	1
CT 87.01 BG 3	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 87.02 BG 1	Philadelphia	1
CT 88.01 BG 1	Philadelphia	2
CT 88.01 BG 2	Philadelphia	1
CT 88.02 BG 1	Philadelphia	1
CT 88.02 BG 2	Philadelphia	1
CT 88.02 BG 3	Philadelphia	2
CT 88.02 BG 4	Philadelphia	2
CT 90 BG 2	Philadelphia	2
CT 90 BG 3	Philadelphia	2
CT 90 BG 4	Philadelphia	2
CT 91 BG 1	Philadelphia	3
CT 91 BG 2	Philadelphia	3
CT 91 BG 3	Philadelphia	1
CT 92 BG 1	Philadelphia	1
CT 92 BG 2	Philadelphia	1
CT 93 BG 1	Philadelphia	1
CT 93 BG 2	Philadelphia	1
CT 93 BG 3	Philadelphia	1
CT 93 BG 4	Philadelphia	1
CT 93 BG 5	Philadelphia	1

Census Tract & Block Group ID	Place Name	Category
CT 94 BG 1	Philadelphia	1
CT 94 BG 2	Philadelphia	1
CT 94 BG 3	Philadelphia	3
CT 94 BG 4	Philadelphia	1
CT 95 BG 1	Philadelphia	1
CT 95 BG 2	Philadelphia	1
CT 95 BG 3	Philadelphia	3
CT 95 BG 4	Philadelphia	1
CT 96 BG 1	Philadelphia	1
CT 96 BG 2	Philadelphia	1
CT 96 BG 3	Philadelphia	1
CT 96 BG 4	Philadelphia	1
CT 96 BG 5	Philadelphia	3
CT 98.01 BG 1	Philadelphia	3
CT 98.01 BG 2	Philadelphia	1
CT 98.02 BG 1	Philadelphia	3
CT 98.02 BG 2	Philadelphia	3
CT 98.02 BG 3	Philadelphia	1
CT 9800 BG 1	Philadelphia	3
CT 9891 BG 1	Philadelphia	1

Table G-EJ19. Census Tracts (CT) and Block Groups (BG) in Delaware County, Pennsylvania (County ID 42-045) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 4003.01 BG 1	Upper Darby	1
CT 4003.01 BG 2	Upper Darby	1
CT 4003.01 BG 3	Upper Darby	1
CT 4003.01 BG 4	Upper Darby	1
CT 4003.02 BG 1	Upper Darby	1
CT 4003.02 BG 2	Upper Darby	1
CT 4003.02 BG 3	Upper Darby	1
CT 4004.01 BG 1	Upper Darby	1
CT 4004.01 BG 2	Upper Darby	1
CT 4004.01 BG 3	Upper Darby	1
CT 4004.02 BG 1	Upper Darby	1
CT 4004.02 BG 2	Upper Darby	1
CT 4004.02 BG 3	Upper Darby	1
CT 4004.02 BG 4	Upper Darby	1
CT 4005 BG 1	Upper Darby	1
CT 4005 BG 2	Upper Darby	3
CT 4005 BG 3	Upper Darby	1
CT 4005 BG 4	Upper Darby	1
CT 4006 BG 1	Upper Darby	1
CT 4006 BG 2	Upper Darby	2
CT 4006 BG 3	Upper Darby	3
CT 4006 BG 4	Upper Darby	3
CT 4006 BG 5	Upper Darby	1

Census Tract & Block Group ID	Place Name	Category
CT 4007 BG 1	Upper Darby	1
CT 4007 BG 2	Upper Darby	1
CT 4007 BG 3	Upper Darby	3
CT 4007 BG 4	Upper Darby	1
CT 4008.01 BG 1	Upper Darby	1
CT 4008.02 BG 1	Upper Darby	1
CT 4008.02 BG 3	Upper Darby	3
CT 4010 BG 2	Upper Darby	3
CT 4011.01 BG 1	Upper Darby	3
CT 4011.01 BG 3	Upper Darby	2
CT 4011.03 BG 2	Upper Darby	3
CT 4011.04 BG 1	Upper Darby	2
CT 4012 BG 2	Upper Darby	2
CT 4012 BG 3	Upper Darby	2
CT 4012 BG 4	Upper Darby	2
CT 4013.01 BG 1	Upper Darby	3
CT 4013.02 BG 1	Upper Darby	2
CT 4014.01 BG 1	Upper Darby	2
CT 4014.01 BG 2	Upper Darby	2
CT 4014.02 BG 2	Upper Darby	3
CT 4014.02 BG 3	Upper Darby	2
CT 4014.02 BG 4	Upper Darby	1
CT 4015.01 BG 2	Upper Darby	2

Census Tract & Block Group ID	Place Name	Category
CT 4015.02 BG 1	Upper Darby	1
CT 4015.02 BG 3	Upper Darby	1
CT 4016 BG 1	Upper Darby	1
CT 4016 BG 2	Upper Darby	1
CT 4017 BG 1	East Lansdowne	1
CT 4018 BG 1	Lansdowne	3
CT 4018 BG 2	Lansdowne	1
CT 4018 BG 3	Lansdowne	1
CT 4019 BG 1	Lansdowne	1
CT 4019 BG 3	Lansdowne	1
CT 4019 BG 4	Lansdowne	3
CT 4019 BG 5	Lansdowne	1
CT 4020 BG 1	Lansdowne	1
CT 4020 BG 2	Lansdowne	3
CT 4021 BG 1	Yeadon	1
CT 4021 BG 2	Yeadon	1
CT 4021 BG 3	Yeadon	3
CT 4021 BG 4	Yeadon	1
CT 4022 BG 1	Yeadon	1
CT 4022 BG 2	Yeadon	1
CT 4023 BG 1	Yeadon	1
CT 4023 BG 2	Yeadon	1
CT 4023 BG 3	Yeadon	1
CT 4024 BG 1	Darby	1
CT 4024 BG 2	Darby	1
CT 4024 BG 3	Darby	1
CT 4025 BG 1	Darby	1
CT 4025 BG 2	Darby	1
CT 4025 BG 3	Darby	1
CT 4026 BG 1	Darby	1
CT 4026 BG 2	Darby	1
CT 4027 BG 1	Colwyn	1
CT 4027 BG 2	Colwyn	1
CT 4028 BG 1	Sharon Hill	1
CT 4028 BG 2	Sharon Hill	1
CT 4028 BG 3	Sharon Hill	3
CT 4028 BG 4	Sharon Hill	3
CT 4028 BG 5	Sharon Hill	1
CT 4029 BG 1	Darby	1
CT 4029 BG 2	Darby	1
CT 4029 BG 3	Darby	1
CT 4030.01 BG 2	Darby	2
CT 4030.02 BG 1	Darby	2
CT 4030.02 BG 2	Darby	2
CT 4031.01 BG 1	Collingdale	1
CT 4031.01 BG 2	Collingdale	1
CT 4031.01 BG 3	Collingdale	1
CT 4031.03 BG 1	Collingdale	1
CT 4031.03 BG 2	Collingdale	3
CT 4031.04 BG 1	Collingdale	1
CT 4031.04 BG 2	Collingdale	1
CT 4032 BG 1	Aldan	3
CT 4032 BG 4	Aldan	1
CT 4033 BG 1	Clifton Heights	2
CT 4033 BG 2	Clifton Heights	1
CT 4033 BG 3	Clifton Heights	1
CT 4033 BG 4	Clifton Heights	2
CT 4033 BG 5	Clifton Heights	3
CT 4034.01 BG 2	Folcroft	1
CT 4034.02 BG 1	Folcroft	1
CT 4034.02 BG 2	Folcroft	1
CT 4035.01 BG 3	Glenolden	2
CT 4035.02 BG 1	Glenolden	2
CT 4035.02 BG 2	Glenolden	1
CT 4036.01 BG 3	Norwood	2
CT 4036.01 BG 4	Norwood	2
CT 4037.01 BG 1	Tinicum	2
CT 4037.02 BG 1	Tinicum	2
CT 4037.02 BG 2	Tinicum	2
CT 4038 BG 3	Prospect Park	3
CT 4038 BG 5	Prospect Park	2
CT 4039.01 BG 2	Ridley Park	2
CT 4040.04 BG 3	Ridley	2
CT 4041.01 BG 4	Ridley	2
CT 4041.02 BG 3	Ridley	2
CT 4041.02 BG 4	Ridley	1
CT 4041.03 BG 1	Ridley	2
CT 4041.03 BG 2	Ridley	2
CT 4043 BG 1	Eddystone	2
CT 4043 BG 2	Eddystone	1
CT 4043 BG 3	Eddystone	2
CT 4044 BG 1	Chester	3
CT 4044 BG 2	Chester	1
CT 4045 BG 1	Chester	1
CT 4045 BG 2	Chester	1
CT 4045 BG 3	Chester	1
CT 4045 BG 4	Chester	1
CT 4046 BG 1	Chester	1
CT 4046 BG 2	Chester	1
CT 4046 BG 3	Chester	3
CT 4047 BG 1	Chester	1
CT 4047 BG 2	Chester	1
CT 4048 BG 1	Chester	1
CT 4048 BG 2	Chester	1
CT 4048 BG 3	Chester	1
CT 4049 BG 1	Chester	1
CT 4049 BG 2	Chester	1
CT 4050 BG 1	Chester	1
CT 4050 BG 2	Chester	1
CT 4050 BG 3	Chester	1
CT 4051 BG 1	Chester	1
CT 4051 BG 2	Chester	1
CT 4052 BG 1	Chester	1
CT 4052 BG 2	Chester	1
CT 4052 BG 3	Chester	1
CT 4053 BG 1	Chester	1
CT 4053 BG 2	Chester	1
CT 4054 BG 1	Chester	1

Census Tract & Block Group ID	Place Name	Category
CT 4054 BG 2	Chester	1
CT 4061 BG 1	Parkside	2
CT 4061 BG 2	Parkside	2
CT 4062.02 BG 4	Brookhaven	2
CT 4063 BG 1	Upland	1
CT 4063 BG 2	Upland	1
CT 4063 BG 3	Upland	1
CT 4064.01 BG 1	Chester	1
CT 4064.01 BG 2	Chester	1
CT 4064.02 BG 1	Chester	1
CT 4064.02 BG 2	Chester	1
CT 4065 BG 1	Trainer	1
CT 4065 BG 2	Trainer	1
CT 4066 BG 1	Marcus Hook	2
CT 4066 BG 2	Marcus Hook	1
CT 4067 BG 1	Lower Chichester	2
CT 4067 BG 2	Lower Chichester	2
CT 4068.01 BG 1	Upper Chichester	2
CT 4068.01 BG 3	Upper Chichester	2
CT 4068.02 BG 2	Upper Chichester	1
CT 4068.02 BG 3	Upper Chichester	2
CT 4068.02 BG 4	Upper Chichester	2
CT 4068.03 BG 4	Upper Chichester	2
CT 4069.03 BG 2	Aston	2
CT 4074.01 BG 4	Nether Providence	3
CT 4075.01 BG 1	Media	2
CT 4077 BG 2	Springfield	1
CT 4078.06 BG 1	Springfield	3
CT 4079.03 BG 1	Upper Providence	3
CT 4085 BG 1	Haverford	3
CT 4088 BG 1	Haverford	2
CT 4088 BG 5	Haverford	2
CT 4096.02 BG 1	Radnor	1
CT 4096.02 BG 3	Radnor	2
CT 4098.02 BG 2	Radnor	2
CT 4098.03 BG 2	Radnor	2
CT 4098.03 BG 5	Radnor	2
CT 4099.02 BG 1	Newtown	2
CT 4101 BG 3	Thornbury	2
CT 4103.01 BG 2	Concord	3
CT 4105 BG 1	Millbourne	1
CT 4105 BG 2	Upper Darby	1
CT 4105 BG 3	Upper Darby	1
CT 4105 BG 4	Upper Darby	1
CT 4105 BG 5	Upper Darby	1
CT 4107 BG 1	Chester	1
CT 4107 BG 2	Chester	1
CT 4107 BG 3	Chester	1
CT 4107 BG 4	Chester	1
CT 4107 BG 5	Chester	1
CT 4108 BG 2	Nether Providence	2
CT 4108 BG 7	Nether Providence	3

Table G-EJ20. Census Tracts (CT) and Block Groups (BG) in Baltimore County, Maryland (County ID 24-005) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 4001 BG 1	Catonsville	3
CT 4001 BG 3	Catonsville	2
CT 4002 BG 1	Catonsville	2
CT 4004 BG 2	Catonsville	2
CT 4006 BG 2	Catonsville	1
CT 4006 BG 3	Catonsville	2
CT 4007.01 BG 2	Catonsville	3
CT 4008 BG 1	Catonsville	1
CT 4008 BG 2	Catonsville	2
CT 4009 BG 1	Catonsville	3
CT 4010 BG 1	Catonsville	2
CT 4011.01 BG 1	Woodlawn	1
CT 4011.01 BG 2	Woodlawn	3
CT 4011.01 BG 3	Woodlawn	1
CT 4011.01 BG 4	Woodlawn	1
CT 4011.02 BG 1	Woodlawn	1
CT 4012 BG 1	Woodlawn	3
CT 4012 BG 2	Woodlawn	3
CT 4013.01 BG 1	Woodlawn	1
CT 4013.01 BG 2	Woodlawn	3
CT 4013.01 BG 3	Woodlawn	1
CT 4013.02 BG 1	Woodlawn	1
CT 4013.02 BG 2	Woodlawn	3
CT 4015.04 BG 1	Woodlawn	3
CT 4015.04 BG 2	Woodlawn	3
CT 4015.04 BG 3	Woodlawn	1
CT 4015.05 BG 1	Woodlawn	1
CT 4015.05 BG 2	Woodlawn	1
CT 4015.05 BG 3	Woodlawn	1
CT 4015.06 BG 1	Woodlawn	3
CT 4015.06 BG 2	Woodlawn	3
CT 4015.06 BG 3	Woodlawn	3
CT 4015.07 BG 1	Woodlawn	1
CT 4015.07 BG 2	Woodlawn	1
CT 4015.07 BG 3	Woodlawn	1
CT 4015.07 BG 4	Woodlawn	1

Census Tract & Block Group ID	Place Name	Category
CT 4022.01 BG 1	Un-named Area	3
CT 4022.01 BG 2	Un-named Area	1
CT 4023.02 BG 1	Milford Mill	3
CT 4023.02 BG 2	Milford Mill	1
CT 4023.03 BG 1	Milford Mill	1
CT 4023.03 BG 2	Milford Mill	3
CT 4023.03 BG 3	Milford Mill	3
CT 4023.03 BG 4	Milford Mill	1
CT 4023.03 BG 5	Milford Mill	3
CT 4023.04 BG 1	Lochearn	1
CT 4023.04 BG 2	Lochearn	3
CT 4023.04 BG 3	Lochearn	1
CT 4023.05 BG 1	Lochearn	1
CT 4023.05 BG 2	Lochearn	1
CT 4023.06 BG 1	Milford Mill	1
CT 4023.06 BG 2	Milford Mill	1
CT 4023.07 BG 1	Milford Mill	1
CT 4023.07 BG 2	Milford Mill	3
CT 4023.07 BG 3	Milford Mill	1
CT 4024.03 BG 1	Lochearn	1
CT 4024.03 BG 2	Lochearn	3
CT 4024.04 BG 1	Lochearn	1
CT 4024.04 BG 2	Lochearn	3
CT 4024.04 BG 3	Lochearn	1
CT 4024.05 BG 1	Woodlawn	3
CT 4024.05 BG 2	Lochearn	1
CT 4024.06 BG 1	Milford Mill	3
CT 4024.06 BG 2	Milford Mill	1
CT 4024.06 BG 3	Milford Mill	1
CT 4024.07 BG 1	Milford Mill	3
CT 4024.07 BG 2	Milford Mill	1
CT 4025.03 BG 1	Randallstown	1
CT 4025.03 BG 2	Randallstown	3
CT 4025.03 BG 3	Randallstown	1
CT 4025.04 BG 1	Randallstown	3
CT 4025.04 BG 2	Randallstown	3
CT 4025.05 BG 1	Randallstown	3
CT 4025.05 BG 2	Randallstown	1
CT 4025.06 BG 1	Randallstown	3
CT 4025.06 BG 2	Randallstown	3
CT 4025.09 BG 1	Owings Mills	3
CT 4025.09 BG 2	Owings Mills	1
CT 4025.09 BG 3	Owings Mills	3
CT 4026.02 BG 1	Randallstown	1
CT 4026.02 BG 2	Randallstown	1
CT 4026.03 BG 1	Randallstown	3
CT 4026.03 BG 2	Owings Mills	3
CT 4026.03 BG 3	Randallstown	3
CT 4026.04 BG 1	Randallstown	3
CT 4026.04 BG 2	Randallstown	3
CT 4026.04 BG 3	Randallstown	1
CT 4031 BG 1	Lochearn	3
CT 4031 BG 2	Lochearn	3
CT 4032.01 BG 1	Lochearn	1
CT 4032.01 BG 2	Lochearn	1
CT 4032.02 BG 1	Lochearn	3
CT 4033 BG 1	Lochearn	3
CT 4033 BG 2	Lochearn	3
CT 4034.02 BG 1	Pikesville	1
CT 4034.02 BG 2	Pikesville	3
CT 4034.02 BG 3	Pikesville	1
CT 4034.02 BG 4	Pikesville	1
CT 4036.02 BG 1	Towson	1
CT 4037.01 BG 3	Garrison	1
CT 4037.01 BG 5	Garrison	3
CT 4037.02 BG 2	Garrison	3
CT 4041.01 BG 2	Owings Mills	3
CT 4041.02 BG 1	Owings Mills	3
CT 4041.02 BG 2	Owings Mills	1
CT 4042.01 BG 1	Reisterstown	3
CT 4042.01 BG 2	Reisterstown	1
CT 4042.01 BG 3	Reisterstown	3
CT 4042.02 BG 1	Owings Mills	1
CT 4042.02 BG 2	Owings Mills	1
CT 4042.02 BG 3	Owings Mills	1
CT 4042.02 BG 4	Owings Mills	1
CT 4044.02 BG 2	Un-named Area	1
CT 4044.03 BG 1	Reisterstown	3
CT 4044.03 BG 2	Reisterstown	1
CT 4044.04 BG 1	Reisterstown	1
CT 4045.01 BG 1	Reisterstown	2
CT 4045.01 BG 4	Reisterstown	3
CT 4045.02 BG 1	Reisterstown	1
CT 4045.02 BG 3	Reisterstown	1
CT 4046 BG 2	Un-named Area	2
CT 4083.04 BG 2	Un-named Area	1
CT 4085.03 BG 2	Cockeysville	1
CT 4085.06 BG 1	Cockeysville	1
CT 4085.06 BG 2	Cockeysville	1
CT 4085.07 BG 1	Cockeysville	3
CT 4085.07 BG 2	Cockeysville	1
CT 4085.07 BG 3	Cockeysville	3
CT 4113.03 BG 1	Perry Hall	1
CT 4113.06 BG 1	Perry Hall	1
CT 4113.06 BG 3	Perry Hall	3
CT 4113.07 BG 2	White Marsh	3
CT 4113.09 BG 3	Un-named Area	3
CT 4114.07 BG 4	Carney	1
CT 4114.08 BG 1	Carney	1
CT 4114.08 BG 2	Perry Hall	1
CT 4114.1 BG 3	Perry Hall	3
CT 4201 BG 1	Dundalk	2
CT 4203.01 BG 1	Dundalk	2
CT 4203.02 BG 1	Dundalk	2
CT 4203.02 BG 2	Dundalk	2
CT 4203.03 BG 1	Dundalk	2
CT 4204.01 BG 1	Dundalk	2
CT 4204.01 BG 2	Dundalk	1
CT 4204.01 BG 3	Dundalk	2
CT 4204.02 BG 1	Dundalk	2
CT 4205 BG 1	Dundalk	2
CT 4205 BG 2	Dundalk	1
CT 4206 BG 1	Dundalk	2
CT 4206 BG 2	Dundalk	2

Census Tract & Block Group ID	Place Name	Category
CT 4206 BG 3	Dundalk	2
CT 4207.01 BG 1	Dundalk	2
CT 4207.02 BG 1	Dundalk	2
CT 4208 BG 1	Dundalk	2
CT 4208 BG 3	Dundalk	2
CT 4209 BG 1	Dundalk	2
CT 4209 BG 2	Dundalk	2
CT 4209 BG 3	Dundalk	2
CT 4210 BG 1	Dundalk	2
CT 4211.01 BG 1	Dundalk	2
CT 4211.01 BG 2	Dundalk	2
CT 4211.02 BG 2	Dundalk	2
CT 4212 BG 1	Dundalk	2
CT 4212 BG 2	Dundalk	2
CT 4213 BG 1	Dundalk	1
CT 4213 BG 2	Dundalk	1
CT 4213 BG 3	Dundalk	1
CT 4301.01 BG 1	Baltimore Highlands	1
CT 4301.01 BG 2	Baltimore Highlands	1
CT 4301.04 BG 2	Baltimore Highlands	2
CT 4302 BG 1	Lansdowne	2
CT 4302 BG 3	Lansdowne	2
CT 4303 BG 1	Lansdowne	2
CT 4303 BG 2	Lansdowne	1
CT 4303 BG 3	Lansdowne	2
CT 4303 BG 4	Lansdowne	1
CT 4304 BG 3	Arbutus	2
CT 4308 BG 1	Arbutus	2
CT 4308 BG 2	Arbutus	2
CT 4309 BG 1	Arbutus	1
CT 4309 BG 2	Arbutus	1
CT 4309 BG 3	Arbutus	1
CT 4401 BG 1	Parkville	2
CT 4402 BG 1	Overlea	1
CT 4403 BG 1	Overlea	1
CT 4404 BG 1	Overlea	1
CT 4404 BG 2	Overlea	2
CT 4404 BG 3	Overlea	3
CT 4404 BG 4	Overlea	2
CT 4405 BG 2	Overlea	2
CT 4407.01 BG 1	Rossville	1
CT 4407.01 BG 2	Rossville	1
CT 4407.01 BG 3	Rossville	1
CT 4407.02 BG 1	Rossville	1
CT 4408 BG 1	Rossville	3
CT 4409 BG 1	Rosedale	1
CT 4409 BG 2	Rosedale	1
CT 4410 BG 1	Rosedale	3
CT 4410 BG 2	Rosedale	1
CT 4411.01 BG 2	Rosedale	2
CT 4411.02 BG 1	Rosedale	1
CT 4411.02 BG 4	Rosedale	2
CT 4501 BG 3	Rosedale	2
CT 4502 BG 2	Essex	2
CT 4503 BG 1	Essex	2
CT 4503 BG 2	Essex	2
CT 4504 BG 2	Essex	2

Census Tract & Block Group ID	Place Name	Category
CT 4505.01 BG 1	Essex	2
CT 4505.01 BG 2	Essex	2
CT 4505.01 BG 3	Essex	2
CT 4505.03 BG 1	Essex	1
CT 4505.03 BG 2	Essex	1
CT 4505.03 BG 3	Essex	1
CT 4505.04 BG 1	Essex	2
CT 4505.04 BG 2	Essex	1
CT 4505.04 BG 3	Essex	1
CT 4508 BG 1	Essex	2
CT 4508 BG 2	Essex	1
CT 4508 BG 3	Essex	1
CT 4509 BG 1	Essex	2
CT 4509 BG 2	Essex	2
CT 4511 BG 1	Essex	1
CT 4512 BG 2	Middle River	2
CT 4513 BG 1	Middle River	1
CT 4513 BG 2	Middle River	2
CT 4514.01 BG 1	Middle River	1
CT 4514.01 BG 2	Middle River	1
CT 4514.02 BG 2	Middle River	1
CT 4514.02 BG 3	Middle River	1
CT 4515 BG 1	Middle River	2
CT 4515 BG 2	Middle River	1
CT 4515 BG 3	Middle River	2
CT 4516 BG 1	Middle River	2
CT 4518.01 BG 1	Un-named Area	2
CT 4518.01 BG 4	Un-named Area	1
CT 4518.02 BG 3	Middle River	2
CT 4521 BG 2	Edgemere	2
CT 4521 BG 3	Edgemere	2
CT 4523 BG 1	Dundalk	1
CT 4523 BG 2	Dundalk	2
CT 4524 BG 1	Dundalk	2
CT 4524 BG 2	Dundalk	2
CT 4525 BG 2	Dundalk	2
CT 4903.01 BG 1	Towson	1
CT 4903.01 BG 2	Towson	2
CT 4903.02 BG 1	Towson	3
CT 4906.05 BG 1	Towson	2
CT 4906.05 BG 2	Towson	3
CT 4908 BG 2	Towson	2
CT 4909 BG 1	Towson	2
CT 4909 BG 2	Towson	2
CT 4909 BG 3	Towson	2
CT 4911 BG 1	Towson	3
CT 4911 BG 2	Towson	1
CT 4912.02 BG 1	Towson	2
CT 4913 BG 2	Towson	1
CT 4914.01 BG 1	Parkville	1
CT 4914.01 BG 2	Parkville	1
CT 4914.01 BG 3	Parkville	1
CT 4914.02 BG 1	Parkville	3
CT 4914.02 BG 2	Parkville	1
CT 4915 BG 1	Parkville	2
CT 4915 BG 3	Parkville	1
CT 4916 BG 1	Parkville	2

Census Tract & Block Group ID	Place Name	Category
CT 4916 BG 2	Parkville	2
CT 4916 BG 3	Parkville	3
CT 4917.01 BG 2	Carney	1
CT 4919 BG 1	Carney	2
CT 4920.01 BG 1	Parkville	3
CT 4920.02 BG 3	Parkville	1
CT 4921.01 BG 1	Parkville	2
CT 4922 BG 2	Carney	2
CT 4923 BG 1	Essex	2

Census Tract & Block Group ID	Place Name	Category
CT 4923 BG 2	Essex	2
CT 4924.01 BG 1	Randallstown	3
CT 4924.01 BG 2	Owings Mills	3
CT 4924.02 BG 1	Owings Mills	3
CT 4924.02 BG 2	Owings Mills	3
CT 4925 BG 2	Catonsville	1
CT 4926 BG 1	Carney	3
CT 4926 BG 2	Carney	2
CT 4926 BG 3	Carney	1

Table G-EJ21. Census Tracts (CT) and Block Groups (BG) in the City of Baltimore, Maryland (County ID 24-510) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.
Note that Baltimore is an independent city in Maryland and is considered the equivalent of a county.

Census Tract & Block Group ID	Place Name	Category
CT 1001 BG 1	Baltimore	1
CT 1001 BG 2	Baltimore	1
CT 1001 BG 3	Baltimore	3
CT 1001 BG 4	Baltimore	1
CT 1002 BG 1	Baltimore	1
CT 1002 BG 2	Baltimore	1
CT 1002 BG 3	Baltimore	1
CT 1003 BG 1	Baltimore	3
CT 1101 BG 2	Baltimore	3
CT 1102 BG 2	Baltimore	2
CT 1201 BG 4	Baltimore	1
CT 1202.02 BG 2	Baltimore	1
CT 1202.02 BG 3	Baltimore	1
CT 1202.02 BG 4	Baltimore	2
CT 1202.02 BG 5	Baltimore	3
CT 1203 BG 1	Baltimore	3
CT 1203 BG 2	Baltimore	3
CT 1203 BG 3	Baltimore	1
CT 1203 BG 4	Baltimore	1
CT 1204 BG 1	Baltimore	1
CT 1204 BG 2	Baltimore	1
CT 1205 BG 1	Baltimore	3
CT 1205 BG 2	Baltimore	1
CT 1206 BG 1	Baltimore	3
CT 1206 BG 2	Baltimore	1
CT 1206 BG 3	Baltimore	1
CT 1207 BG 2	Baltimore	2
CT 1301 BG 1	Baltimore	3
CT 1301 BG 2	Baltimore	1
CT 1301 BG 3	Baltimore	3
CT 1301 BG 4	Baltimore	1
CT 1302 BG 1	Baltimore	3
CT 1302 BG 2	Baltimore	3
CT 1302 BG 3	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 1302 BG 4	Baltimore	1
CT 1303 BG 1	Baltimore	3
CT 1303 BG 2	Baltimore	1
CT 1303 BG 3	Baltimore	1
CT 1304 BG 1	Baltimore	1
CT 1304 BG 2	Baltimore	1
CT 1304 BG 3	Baltimore	1
CT 1307 BG 1	Baltimore	2
CT 1308.03 BG 1	Baltimore	2
CT 1308.05 BG 1	Baltimore	3
CT 1401 BG 2	Baltimore	3
CT 1401 BG 3	Baltimore	1
CT 1402 BG 1	Baltimore	1
CT 1402 BG 2	Baltimore	3
CT 1402 BG 3	Baltimore	1
CT 1402 BG 4	Baltimore	1
CT 1403 BG 1	Baltimore	1
CT 1403 BG 2	Baltimore	1
CT 1403 BG 3	Baltimore	3
CT 1403 BG 4	Baltimore	3
CT 1501 BG 1	Baltimore	1
CT 1501 BG 2	Baltimore	1
CT 1501 BG 3	Baltimore	1
CT 1502 BG 1	Baltimore	3
CT 1502 BG 2	Baltimore	1
CT 1502 BG 3	Baltimore	1
CT 1503 BG 1	Baltimore	1
CT 1503 BG 2	Baltimore	3
CT 1503 BG 3	Baltimore	1
CT 1504 BG 1	Baltimore	1
CT 1504 BG 2	Baltimore	1
CT 1504 BG 3	Baltimore	1
CT 1505 BG 1	Baltimore	1
CT 1505 BG 2	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 1506 BG 1	Baltimore	1
CT 1506 BG 2	Baltimore	1
CT 1506 BG 3	Baltimore	1
CT 1506 BG 4	Baltimore	1
CT 1506 BG 5	Baltimore	1
CT 1507.01 BG 1	Baltimore	1
CT 1507.01 BG 2	Baltimore	3
CT 1507.01 BG 3	Baltimore	1
CT 1507.02 BG 1	Baltimore	3
CT 1507.02 BG 2	Baltimore	3
CT 1507.02 BG 3	Baltimore	1
CT 1508 BG 1	Baltimore	1
CT 1508 BG 2	Baltimore	1
CT 1508 BG 3	Baltimore	1
CT 1508 BG 4	Baltimore	3
CT 1508 BG 5	Baltimore	1
CT 1508 BG 6	Baltimore	3
CT 1509 BG 1	Baltimore	1
CT 1509 BG 2	Baltimore	3
CT 1509 BG 3	Baltimore	3
CT 1509 BG 4	Baltimore	3
CT 1510 BG 1	Baltimore	1
CT 1510 BG 2	Baltimore	1
CT 1510 BG 3	Baltimore	1
CT 1510 BG 4	Baltimore	3
CT 1510 BG 5	Baltimore	3
CT 1510 BG 6	Baltimore	1
CT 1510 BG 7	Baltimore	1
CT 1511 BG 1	Baltimore	3
CT 1511 BG 2	Baltimore	1
CT 1511 BG 3	Baltimore	3
CT 1511 BG 4	Baltimore	3
CT 1511 BG 5	Baltimore	1
CT 1511 BG 6	Baltimore	3
CT 1512 BG 1	Baltimore	1
CT 1512 BG 2	Baltimore	1
CT 1512 BG 3	Baltimore	1
CT 1512 BG 4	Baltimore	1
CT 1512 BG 5	Baltimore	1
CT 1513 BG 1	Baltimore	1
CT 1513 BG 2	Baltimore	1
CT 1513 BG 3	Baltimore	1
CT 1513 BG 4	Baltimore	1
CT 1513 BG 5	Baltimore	1
CT 1601 BG 1	Baltimore	1
CT 1601 BG 2	Baltimore	1
CT 1601 BG 3	Baltimore	1
CT 1601 BG 4	Baltimore	1
CT 1602 BG 1	Baltimore	3
CT 1602 BG 2	Baltimore	1
CT 1602 BG 3	Baltimore	1
CT 1603 BG 1	Baltimore	1
CT 1603 BG 2	Baltimore	1
CT 1604 BG 1	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 1604 BG 2	Baltimore	1
CT 1604 BG 3	Baltimore	1
CT 1604 BG 4	Baltimore	1
CT 1605 BG 1	Baltimore	1
CT 1605 BG 2	Baltimore	1
CT 1605 BG 3	Baltimore	1
CT 1605 BG 4	Baltimore	1
CT 1605 BG 5	Baltimore	3
CT 1606 BG 1	Baltimore	1
CT 1606 BG 2	Baltimore	1
CT 1606 BG 3	Baltimore	1
CT 1606 BG 4	Baltimore	1
CT 1606 BG 5	Baltimore	3
CT 1607 BG 1	Baltimore	1
CT 1607 BG 2	Baltimore	1
CT 1607 BG 3	Baltimore	1
CT 1607 BG 4	Baltimore	1
CT 1607 BG 5	Baltimore	3
CT 1607 BG 6	Baltimore	1
CT 1607 BG 7	Baltimore	1
CT 1608.01 BG 1	Baltimore	3
CT 1608.01 BG 2	Baltimore	1
CT 1608.01 BG 3	Baltimore	3
CT 1608.01 BG 4	Baltimore	3
CT 1608.02 BG 1	Baltimore	1
CT 1608.02 BG 2	Baltimore	1
CT 1608.02 BG 3	Baltimore	1
CT 1701 BG 1	Baltimore	1
CT 1701 BG 2	Baltimore	1
CT 1702 BG 1	Baltimore	1
CT 1702 BG 2	Baltimore	1
CT 1702 BG 3	Baltimore	1
CT 1703 BG 1	Baltimore	1
CT 1703 BG 2	Baltimore	1
CT 1801 BG 1	Baltimore	1
CT 1801 BG 2	Baltimore	1
CT 1802 BG 1	Baltimore	1
CT 1802 BG 2	Baltimore	1
CT 1803 BG 1	Baltimore	3
CT 1803 BG 2	Baltimore	1
CT 1901 BG 1	Baltimore	1
CT 1901 BG 2	Baltimore	1
CT 1901 BG 3	Baltimore	1
CT 1902 BG 1	Baltimore	3
CT 1902 BG 2	Baltimore	1
CT 1903 BG 1	Baltimore	1
CT 1903 BG 2	Baltimore	1
CT 1903 BG 3	Baltimore	1
CT 1903 BG 4	Baltimore	1
CT 2001 BG 1	Baltimore	1
CT 2001 BG 2	Baltimore	1
CT 2002 BG 1	Baltimore	1
CT 2002 BG 2	Baltimore	1
CT 2002 BG 3	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 2002 BG 4	Baltimore	1
CT 2002 BG 5	Baltimore	1
CT 2003 BG 1	Baltimore	1
CT 2003 BG 2	Baltimore	1
CT 2004 BG 1	Baltimore	1
CT 2004 BG 2	Baltimore	1
CT 2005 BG 1	Baltimore	1
CT 2005 BG 2	Baltimore	3
CT 2005 BG 3	Baltimore	1
CT 2005 BG 4	Baltimore	1
CT 2005 BG 5	Baltimore	1
CT 2006 BG 1	Baltimore	2
CT 2006 BG 2	Baltimore	1
CT 2006 BG 3	Baltimore	1
CT 2007.01 BG 1	Baltimore	1
CT 2007.01 BG 2	Baltimore	1
CT 2007.01 BG 3	Baltimore	1
CT 2007.01 BG 4	Baltimore	3
CT 2007.01 BG 5	Baltimore	1
CT 2007.02 BG 1	Baltimore	1
CT 2007.02 BG 2	Baltimore	1
CT 2008 BG 1	Baltimore	1
CT 2008 BG 2	Baltimore	1
CT 2008 BG 3	Baltimore	1
CT 2101 BG 1	Baltimore	1
CT 2101 BG 2	Baltimore	1
CT 2102 BG 1	Baltimore	1
CT 2102 BG 2	Baltimore	1
CT 2301 BG 2	Baltimore	1
CT 2501.01 BG 1	Baltimore	1
CT 2501.01 BG 2	Baltimore	3
CT 2501.02 BG 1	Baltimore	1
CT 2501.02 BG 2	Baltimore	1
CT 2501.03 BG 1	Baltimore	1
CT 2501.03 BG 4	Baltimore	3
CT 2502.03 BG 1	Baltimore	1
CT 2502.03 BG 2	Baltimore	1
CT 2502.04 BG 1	Baltimore	1
CT 2502.04 BG 2	Baltimore	1
CT 2502.05 BG 1	Baltimore	2
CT 2502.05 BG 2	Baltimore	1
CT 2502.05 BG 4	Baltimore	1
CT 2502.05 BG 5	Baltimore	3
CT 2502.06 BG 1	Baltimore	2
CT 2502.07 BG 1	Baltimore	1
CT 2502.07 BG 2	Baltimore	1
CT 2503.01 BG 1	Baltimore	3
CT 2503.01 BG 2	Baltimore	1
CT 2503.03 BG 1	Baltimore	2
CT 2503.03 BG 2	Baltimore	1
CT 2503.03 BG 3	Baltimore	2
CT 2504.01 BG 1	Baltimore	2
CT 2504.01 BG 3	Baltimore	1
CT 2504.02 BG 1	Baltimore	3
CT 2504.02 BG 2	Baltimore	1
CT 2504.02 BG 3	Baltimore	3
CT 2504.02 BG 4	Baltimore	1
CT 2505 BG 2	Baltimore	1
CT 2505 BG 3	Baltimore	2
CT 2505 BG 4	Baltimore	3
CT 2505 BG 5	Baltimore	2
CT 2601.01 BG 1	Baltimore	3
CT 2601.01 BG 2	Baltimore	3
CT 2601.01 BG 3	Baltimore	3
CT 2601.01 BG 4	Baltimore	3
CT 2601.01 BG 5	Baltimore	3
CT 2601.02 BG 1	Baltimore	3
CT 2601.02 BG 2	Baltimore	1
CT 2601.02 BG 3	Baltimore	1
CT 2601.02 BG 4	Baltimore	3
CT 2601.02 BG 5	Baltimore	3
CT 2602.01 BG 1	Baltimore	1
CT 2602.01 BG 2	Baltimore	3
CT 2602.01 BG 3	Baltimore	1
CT 2602.01 BG 4	Baltimore	1
CT 2602.02 BG 1	Baltimore	2
CT 2602.02 BG 2	Baltimore	3
CT 2602.02 BG 3	Baltimore	1
CT 2602.02 BG 4	Baltimore	1
CT 2602.03 BG 1	Baltimore	1
CT 2602.03 BG 2	Baltimore	3
CT 2603.01 BG 1	Baltimore	1
CT 2603.01 BG 2	Baltimore	3
CT 2603.01 BG 3	Baltimore	1
CT 2603.01 BG 4	Baltimore	1
CT 2603.01 BG 5	Baltimore	1
CT 2603.02 BG 1	Baltimore	3
CT 2603.02 BG 2	Baltimore	1
CT 2603.02 BG 3	Baltimore	1
CT 2603.02 BG 4	Baltimore	1
CT 2603.02 BG 5	Baltimore	3
CT 2603.02 BG 6	Baltimore	1
CT 2603.03 BG 1	Baltimore	1
CT 2604.01 BG 1	Baltimore	1
CT 2604.01 BG 2	Baltimore	1
CT 2604.01 BG 3	Baltimore	2
CT 2604.02 BG 1	Baltimore	3
CT 2604.02 BG 2	Baltimore	1
CT 2604.03 BG 1	Baltimore	1
CT 2604.04 BG 2	Baltimore	3
CT 2604.04 BG 3	Baltimore	1
CT 2605.01 BG 1	Baltimore	1
CT 2605.01 BG 2	Baltimore	2
CT 2606.04 BG 1	Baltimore	1
CT 2606.04 BG 2	Baltimore	3
CT 2606.04 BG 3	Baltimore	1
CT 2606.05 BG 1	Baltimore	1
CT 2606.05 BG 2	Baltimore	2

Census Tract & Block Group ID	Place Name	Category
CT 2606.05 BG 3	Baltimore	1
CT 2606.05 BG 4	Baltimore	2
CT 2606.05 BG 5	Baltimore	2
CT 2607 BG 1	Baltimore	3
CT 2607 BG 2	Baltimore	1
CT 2608 BG 1	Baltimore	1
CT 2608 BG 2	Baltimore	1
CT 2610 BG 1	Baltimore	3
CT 2610 BG 2	Baltimore	1
CT 2610 BG 3	Baltimore	1
CT 2701.01 BG 2	Baltimore	3
CT 2701.02 BG 1	Baltimore	3
CT 2701.02 BG 2	Baltimore	1
CT 2701.02 BG 3	Baltimore	3
CT 2701.02 BG 4	Baltimore	3
CT 2702 BG 1	Baltimore	3
CT 2702 BG 3	Baltimore	3
CT 2703.01 BG 2	Baltimore	3
CT 2703.01 BG 3	Baltimore	1
CT 2703.01 BG 4	Baltimore	3
CT 2703.02 BG 2	Baltimore	3
CT 2704.01 BG 1	Baltimore	3
CT 2704.01 BG 3	Baltimore	1
CT 2704.01 BG 4	Baltimore	3
CT 2704.02 BG 1	Baltimore	3
CT 2704.02 BG 3	Baltimore	3
CT 2704.02 BG 4	Baltimore	3
CT 2705.01 BG 1	Baltimore	3
CT 2705.01 BG 4	Baltimore	3
CT 2705.02 BG 1	Baltimore	3
CT 2705.02 BG 2	Baltimore	3
CT 2705.02 BG 3	Baltimore	3
CT 2706 BG 2	Baltimore	3
CT 2706 BG 3	Baltimore	1
CT 2706 BG 4	Baltimore	3
CT 2706 BG 5	Baltimore	1
CT 2706 BG 6	Baltimore	3
CT 2707.01 BG 1	Baltimore	3
CT 2707.02 BG 1	Baltimore	1
CT 2707.02 BG 2	Baltimore	3
CT 2707.03 BG 3	Baltimore	3
CT 2708.01 BG 1	Baltimore	1
CT 2708.01 BG 2	Baltimore	3
CT 2708.01 BG 3	Baltimore	3
CT 2708.01 BG 4	Baltimore	3
CT 2708.02 BG 1	Baltimore	3
CT 2708.02 BG 2	Baltimore	3
CT 2708.02 BG 3	Baltimore	3
CT 2708.02 BG 4	Baltimore	1
CT 2708.02 BG 5	Baltimore	3
CT 2708.03 BG 1	Baltimore	3
CT 2708.03 BG 2	Baltimore	3
CT 2708.03 BG 3	Baltimore	3
CT 2708.04 BG 1	Baltimore	3

Census Tract & Block Group ID	Place Name	Category
CT 2708.04 BG 2	Baltimore	1
CT 2708.04 BG 4	Baltimore	3
CT 2708.05 BG 1	Baltimore	3
CT 2708.05 BG 2	Baltimore	1
CT 2708.05 BG 3	Baltimore	1
CT 2708.05 BG 4	Baltimore	3
CT 2708.05 BG 5	Baltimore	3
CT 2709.01 BG 1	Baltimore	3
CT 2709.01 BG 2	Baltimore	3
CT 2709.01 BG 3	Baltimore	3
CT 2709.02 BG 1	Baltimore	1
CT 2709.02 BG 2	Baltimore	3
CT 2709.02 BG 3	Baltimore	3
CT 2709.03 BG 1	Baltimore	3
CT 2709.03 BG 2	Baltimore	3
CT 2709.03 BG 3	Baltimore	3
CT 2710.01 BG 1	Baltimore	1
CT 2710.01 BG 2	Baltimore	1
CT 2710.01 BG 3	Baltimore	1
CT 2710.02 BG 1	Baltimore	1
CT 2710.02 BG 2	Baltimore	3
CT 2710.02 BG 3	Baltimore	1
CT 2710.02 BG 4	Baltimore	1
CT 2710.02 BG 5	Baltimore	1
CT 2711.01 BG 1	Baltimore	1
CT 2716 BG 1	Baltimore	1
CT 2716 BG 2	Baltimore	1
CT 2716 BG 3	Baltimore	1
CT 2716 BG 4	Baltimore	3
CT 2716 BG 5	Baltimore	1
CT 2716 BG 6	Baltimore	1
CT 2717 BG 1	Baltimore	1
CT 2717 BG 2	Baltimore	1
CT 2717 BG 3	Baltimore	3
CT 2717 BG 4	Baltimore	3
CT 2717 BG 5	Baltimore	3
CT 2717 BG 6	Baltimore	3
CT 2718.01 BG 1	Baltimore	3
CT 2718.01 BG 2	Baltimore	1
CT 2718.01 BG 3	Baltimore	1
CT 2718.02 BG 1	Baltimore	1
CT 2718.02 BG 2	Baltimore	1
CT 2718.02 BG 3	Baltimore	1
CT 2718.02 BG 4	Baltimore	1
CT 2719 BG 2	Baltimore	3
CT 2719 BG 3	Baltimore	3
CT 2719 BG 4	Baltimore	1
CT 2719 BG 5	Baltimore	3
CT 2720.03 BG 2	Baltimore	3
CT 2720.03 BG 5	Baltimore	3
CT 2720.04 BG 2	Baltimore	2
CT 2720.05 BG 2	Baltimore	2
CT 2720.06 BG 1	Baltimore	1
CT 2720.07 BG 1	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 2720.07 BG 2	Baltimore	2
CT 2720.07 BG 3	Baltimore	1
CT 2801.01 BG 1	Baltimore	3
CT 2801.01 BG 2	Baltimore	1
CT 2801.01 BG 3	Baltimore	1
CT 2801.02 BG 1	Baltimore	1
CT 2801.02 BG 2	Baltimore	1
CT 2801.02 BG 3	Baltimore	3
CT 2801.02 BG 4	Baltimore	3
CT 2801.02 BG 5	Baltimore	3
CT 2801.02 BG 6	Baltimore	3
CT 2802 BG 1	Baltimore	1
CT 2802 BG 2	Baltimore	1
CT 2802 BG 3	Baltimore	3
CT 2802 BG 4	Baltimore	3
CT 2802 BG 5	Baltimore	3
CT 2802 BG 6	Baltimore	3
CT 2803.01 BG 1	Baltimore	3
CT 2803.01 BG 2	Baltimore	3
CT 2803.01 BG 3	Baltimore	1
CT 2803.02 BG 1	Baltimore	3
CT 2803.02 BG 2	Baltimore	3
CT 2804.01 BG 1	Baltimore	1
CT 2804.01 BG 2	Baltimore	3
CT 2804.01 BG 3	Baltimore	1
CT 2804.01 BG 4	Baltimore	3
CT 2804.01 BG 5	Baltimore	3
CT 2804.02 BG 1	Baltimore	3
CT 2804.02 BG 2	Baltimore	1
CT 2804.03 BG 1	Baltimore	1
CT 2804.03 BG 2	Baltimore	1
CT 2804.03 BG 3	Baltimore	1
CT 2804.03 BG 4	Baltimore	3
CT 2804.03 BG 5	Baltimore	3
CT 2804.04 BG 1	Baltimore	1
CT 2804.04 BG 2	Baltimore	3
CT 2805 BG 1	Baltimore	1
CT 2805 BG 2	Baltimore	1
CT 2805 BG 3	Baltimore	1
CT 2805 BG 4	Baltimore	1
CT 301 BG 1	Baltimore	1
CT 301 BG 2	Baltimore	1
CT 302 BG 1	Baltimore	1
CT 401 BG 2	Baltimore	3
CT 402 BG 1	Baltimore	1
CT 601 BG 1	Baltimore	1
CT 601 BG 2	Baltimore	1
CT 601 BG 4	Baltimore	3
CT 602 BG 1	Baltimore	1
CT 602 BG 3	Baltimore	1
CT 602 BG 4	Baltimore	3
CT 602 BG 5	Baltimore	1
CT 603 BG 1	Baltimore	3
CT 604 BG 1	Baltimore	3

Census Tract & Block Group ID	Place Name	Category
CT 604 BG 2	Baltimore	3
CT 701 BG 1	Baltimore	1
CT 701 BG 2	Baltimore	1
CT 702 BG 1	Baltimore	1
CT 702 BG 2	Baltimore	1
CT 702 BG 3	Baltimore	1
CT 702 BG 4	Baltimore	1
CT 702 BG 5	Baltimore	3
CT 703 BG 1	Baltimore	1
CT 703 BG 2	Baltimore	1
CT 704 BG 1	Baltimore	1
CT 704 BG 2	Baltimore	1
CT 704 BG 3	Baltimore	1
CT 801.01 BG 2	Baltimore	3
CT 801.01 BG 3	Baltimore	1
CT 801.01 BG 4	Baltimore	3
CT 801.02 BG 1	Baltimore	1
CT 801.02 BG 2	Baltimore	1
CT 802 BG 1	Baltimore	3
CT 802 BG 2	Baltimore	1
CT 802 BG 3	Baltimore	1
CT 803.01 BG 1	Baltimore	1
CT 803.01 BG 2	Baltimore	1
CT 803.01 BG 3	Baltimore	1
CT 803.02 BG 1	Baltimore	1
CT 803.02 BG 2	Baltimore	1
CT 803.02 BG 3	Baltimore	1
CT 803.02 BG 4	Baltimore	1
CT 804 BG 1	Baltimore	1
CT 804 BG 2	Baltimore	1
CT 805 BG 1	Baltimore	1
CT 805 BG 2	Baltimore	3
CT 805 BG 3	Baltimore	1
CT 806 BG 1	Baltimore	1
CT 806 BG 2	Baltimore	1
CT 806 BG 3	Baltimore	3
CT 806 BG 4	Baltimore	3
CT 807 BG 1	Baltimore	1
CT 807 BG 2	Baltimore	1
CT 808 BG 1	Baltimore	1
CT 808 BG 2	Baltimore	1
CT 901 BG 1	Baltimore	1
CT 901 BG 2	Baltimore	3
CT 901 BG 4	Baltimore	1
CT 901 BG 5	Baltimore	1
CT 902 BG 1	Baltimore	3
CT 902 BG 2	Baltimore	3
CT 903 BG 1	Baltimore	3
CT 903 BG 2	Baltimore	1
CT 903 BG 3	Baltimore	3
CT 903 BG 4	Baltimore	1
CT 904 BG 1	Baltimore	1
CT 904 BG 2	Baltimore	1
CT 905 BG 1	Baltimore	3

Census Tract & Block Group ID	Place Name	Category
CT 905 BG 2	Baltimore	1
CT 906 BG 1	Baltimore	1
CT 906 BG 2	Baltimore	1
CT 906 BG 3	Baltimore	1
CT 906 BG 4	Baltimore	3
CT 907 BG 1	Baltimore	1
CT 907 BG 2	Baltimore	1
CT 907 BG 3	Baltimore	1
CT 907 BG 4	Baltimore	1

Census Tract & Block Group ID	Place Name	Category
CT 908 BG 1	Baltimore	1
CT 908 BG 2	Baltimore	1
CT 908 BG 3	Baltimore	1
CT 908 BG 4	Baltimore	1
CT 908 BG 5	Baltimore	1
CT 909 BG 1	Baltimore	1
CT 909 BG 2	Baltimore	1
CT 909 BG 3	Baltimore	1
CT 909 BG 4	Baltimore	1

Table G-EJ22. Census Tracts (CT) and Block Groups (BG) in Anne Arundel County, Maryland (County ID 24-003) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.

Census Tract & Block Group ID	Place Name	Category
CT 7011.01 BG 1	Riva	2
CT 7011.01 BG 3	Edgewater	2
CT 7011.02 BG 2	Edgewater	2
CT 7011.02 BG 3	Edgewater	1
CT 7011.02 BG 4	Edgewater	2
CT 7013 BG 3	Un-named Area	1
CT 7014 BG 1	Un-named Area	2
CT 7021 BG 2	Herald Harbor	2
CT 7021 BG 3	Crownsville	2
CT 7022.05 BG 2	Crofton	3
CT 7022.06 BG 1	Crofton	3
CT 7022.06 BG 2	Crofton	3
CT 7022.08 BG 1	Crofton	3
CT 7024.02 BG 1	Parole	2
CT 7025 BG 1	Annapolis Neck	2
CT 7025 BG 2	Annapolis	1
CT 7025 BG 3	Annapolis	1
CT 7025 BG 4	Annapolis Neck	2
CT 7026.01 BG 1	Annapolis Neck	2
CT 7026.01 BG 5	Annapolis	1
CT 7026.02 BG 3	Annapolis Neck	3
CT 7027.01 BG 1	Parole	1
CT 7061.01 BG 2	Annapolis	2
CT 7061.01 BG 3	Annapolis	1
CT 7063.01 BG 1	Annapolis Neck	3
CT 7063.01 BG 2	Annapolis	1
CT 7063.02 BG 1	Annapolis	2
CT 7063.02 BG 2	Annapolis	2
CT 7064.01 BG 1	Annapolis	1
CT 7064.01 BG 2	Annapolis	1
CT 7064.01 BG 3	Annapolis	1
CT 7064.02 BG 1	Annapolis	1
CT 7064.02 BG 2	Annapolis	1
CT 7065 BG 1	Annapolis	1

Census Tract & Block Group ID	Place Name	Category
CT 7065 BG 2	Annapolis	1
CT 7065 BG 3	Annapolis	1
CT 7066 BG 5	Annapolis	1
CT 7067 BG 1	Naval Academy	1
CT 7070.01 BG 1	Shady Side	2
CT 7070.01 BG 3	Shady Side	3
CT 7080.04 BG 1	Un-named Area	2
CT 7080.04 BG 3	Un-named Area	1
CT 7302.03 BG 1	Glen Burnie	2
CT 7302.03 BG 2	Glen Burnie	1
CT 7302.03 BG 3	Glen Burnie	1
CT 7302.03 BG 4	Glen Burnie	1
CT 7302.04 BG 1	Glen Burnie	3
CT 7302.04 BG 2	Glen Burnie	1
CT 7302.04 BG 3	Glen Burnie	1
CT 7304.01 BG 1	Glen Burnie	3
CT 7304.01 BG 2	Glen Burnie	2
CT 7304.02 BG 1	Glen Burnie	1
CT 7304.02 BG 2	Glen Burnie	2
CT 7304.02 BG 3	Glen Burnie	2
CT 7305.02 BG 1	Glen Burnie	2
CT 7305.02 BG 2	Glen Burnie	1
CT 7305.02 BG 3	Glen Burnie	3
CT 7305.04 BG 1	Glen Burnie	3
CT 7305.04 BG 2	Glen Burnie	1
CT 7305.04 BG 3	Glen Burnie	3
CT 7305.05 BG 1	Glen Burnie	1
CT 7305.05 BG 2	Glen Burnie	1
CT 7305.06 BG 1	Glen Burnie	1
CT 7305.06 BG 2	Glen Burnie	1
CT 7305.06 BG 3	Glen Burnie	1
CT 7307 BG 3	Severna Park	2
CT 7307 BG 5	Severna Park	2
CT 7309.01 BG 3	Un-named Area	2

Census Tract & Block Group ID	Place Name	Category
CT 7310.03 BG 1	Cape St. Claire	2
CT 7310.04 BG 1	Cape St. Claire	2
CT 7311.02 BG 1	Arnold	2
CT 7311.04 BG 2	Arnold	2
CT 7312.02 BG 2	Lake Shore	2
CT 7312.03 BG 4	Severna Park	3
CT 7312.03 BG 5	Severna Park	3
CT 7312.04 BG 1	Pasadena	2
CT 7313.03 BG 1	Lake Shore	2
CT 7313.03 BG 4	Un-named Area	2
CT 7313.06 BG 1	Un-named Area	2
CT 7313.07 BG 1	Lake Shore	2
CT 7313.07 BG 2	Lake Shore	2
CT 7313.08 BG 2	Riviera Beach	2
CT 7313.09 BG 1	Riviera Beach	2
CT 7313.09 BG 3	Riviera Beach	2
CT 7313.1 BG 1	Pasadena	2
CT 7313.1 BG 3	Pasadena	2
CT 7313.11 BG 3	Pasadena	2
CT 7401.02 BG 1	Un-named Area	3
CT 7401.02 BG 2	Severn	3
CT 7401.03 BG 1	Severn	3
CT 7401.03 BG 2	Severn	3
CT 7401.03 BG 3	Severn	3
CT 7401.03 BG 4	Severn	3
CT 7401.04 BG 1	Severn	3
CT 7401.04 BG 2	Severn	1
CT 7401.04 BG 3	Severn	1
CT 7401.05 BG 1	Severn	1
CT 7401.05 BG 2	Severn	1
CT 7402.01 BG 2	Severn	1
CT 7402.01 BG 3	Severn	3
CT 7402.01 BG 4	Glen Burnie	1
CT 7402.03 BG 2	Severn	3
CT 7403.03 BG 1	Severn	2
CT 7403.03 BG 2	Severn	3
CT 7403.04 BG 1	Odenton	3
CT 7403.05 BG 1	Odenton	1
CT 7403.05 BG 2	Odenton	1
CT 7403.05 BG 3	Severn	1
CT 7403.05 BG 4	Odenton	3
CT 7404 BG 1	Jessup	3
CT 7405 BG 1	Maryland City	3
CT 7405 BG 2	Maryland City	3
CT 7405 BG 3	Maryland City	1
CT 7406.01 BG 1	Fort Meade	3
CT 7406.01 BG 2	Fort Meade	3
CT 7406.01 BG 3	Fort Meade	1
CT 7406.01 BG 4	Fort Meade	1

Census Tract & Block Group ID	Place Name	Category
CT 7406.02 BG 1	Fort Meade	1
CT 7406.02 BG 2	Fort Meade	1
CT 7406.03 BG 2	Fort Meade	1
CT 7407.01 BG 1	Odenton	1
CT 7407.01 BG 2	Odenton	3
CT 7407.02 BG 1	Odenton	3
CT 7407.02 BG 2	Un-named Area	3
CT 7409 BG 1	Odenton	1
CT 7409 BG 2	Odenton	2
CT 7409 BG 3	Odenton	3
CT 7501.01 BG 1	Brooklyn Park	1
CT 7501.01 BG 2	Brooklyn Park	2
CT 7501.01 BG 3	Brooklyn Park	1
CT 7501.01 BG 4	Brooklyn Park	1
CT 7501.02 BG 1	Brooklyn Park	1
CT 7501.02 BG 2	Brooklyn Park	2
CT 7502.01 BG 1	Brooklyn Park	3
CT 7502.01 BG 2	Brooklyn Park	1
CT 7502.02 BG 1	Brooklyn Park	2
CT 7502.02 BG 2	Brooklyn Park	1
CT 7502.03 BG 1	Brooklyn Park	2
CT 7503 BG 2	Linthicum	2
CT 7508.01 BG 3	Ferndale	2
CT 7508.03 BG 1	Ferndale	1
CT 7508.03 BG 2	Ferndale	2
CT 7508.03 BG 3	Ferndale	1
CT 7508.03 BG 4	Ferndale	1
CT 7508.03 BG 5	Ferndale	1
CT 7508.04 BG 1	Ferndale	1
CT 7508.04 BG 2	Ferndale	2
CT 7509 BG 1	Glen Burnie	2
CT 7509 BG 2	Glen Burnie	1
CT 7510 BG 1	Glen Burnie	2
CT 7510 BG 2	Glen Burnie	1
CT 7510 BG 3	Glen Burnie	2
CT 7511.02 BG 1	Glen Burnie	1
CT 7511.02 BG 2	Glen Burnie	2
CT 7511.03 BG 1	Glen Burnie	2
CT 7511.03 BG 3	Glen Burnie	2
CT 7511.03 BG 4	Glen Burnie	2
CT 7512 BG 3	Un-named Area	3
CT 7514 BG 1	Severn	3
CT 7514 BG 2	Un-named Area	3
CT 7515 BG 1	Maryland City	3
CT 7515 BG 2	Maryland City	1
CT 7515 BG 3	Maryland City	1
CT 7515 BG 4	Maryland City	1
CT 7516 BG 2	Crownsville	2
CT 9800 BG 1	Un-named Area	3

Table G-EJ23. Census Tracts (CT) and Block Groups (BG) in Norfolk, Virginia (County ID 51-710) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.
Note that Norfolk is an independent city in Virginia and is considered the equivalent of a county.

Census Tract & Block Group ID	Place Name	Category
CT 1 BG 1	Norfolk	2
CT 1 BG 2	Norfolk	2
CT 11 BG 1	Norfolk	1
CT 11 BG 2	Norfolk	1
CT 12 BG 2	Norfolk	1
CT 13 BG 1	Norfolk	3
CT 13 BG 2	Norfolk	1
CT 14 BG 1	Norfolk	1
CT 14 BG 2	Norfolk	2
CT 15 BG 2	Norfolk	3
CT 16 BG 1	Norfolk	1
CT 16 BG 2	Norfolk	1
CT 17 BG 2	Norfolk	3
CT 2.01 BG 1	Norfolk	2
CT 2.01 BG 2	Norfolk	2
CT 2.02 BG 2	Norfolk	2
CT 2.02 BG 3	Norfolk	2
CT 24 BG 3	Norfolk	2
CT 25 BG 1	Norfolk	1
CT 25 BG 2	Norfolk	1
CT 26 BG 1	Norfolk	1
CT 26 BG 2	Norfolk	1
CT 27 BG 1	Norfolk	1
CT 27 BG 2	Norfolk	1
CT 27 BG 3	Norfolk	1
CT 28 BG 2	Norfolk	2
CT 29 BG 1	Norfolk	1
CT 29 BG 2	Norfolk	1
CT 29 BG 3	Norfolk	1
CT 29 BG 4	Norfolk	1
CT 3 BG 2	Norfolk	3
CT 3 BG 3	Norfolk	3
CT 30 BG 1	Norfolk	2
CT 31 BG 1	Norfolk	3
CT 31 BG 2	Norfolk	1
CT 31 BG 3	Norfolk	1
CT 32 BG 1	Norfolk	1
CT 32 BG 2	Norfolk	1
CT 32 BG 3	Norfolk	1
CT 33 BG 1	Norfolk	1
CT 33 BG 2	Norfolk	1
CT 34 BG 1	Norfolk	1
CT 34 BG 2	Norfolk	1
CT 35.01 BG 1	Norfolk	1
CT 35.01 BG 2	Norfolk	1
CT 35.01 BG 3	Norfolk	1
CT 35.01 BG 4	Norfolk	1

Census Tract & Block Group ID	Place Name	Category
CT 37 BG 1	Norfolk	2
CT 38 BG 1	Norfolk	2
CT 4 BG 3	Norfolk	2
CT 40.02 BG 4	Norfolk	2
CT 41 BG 1	Norfolk	1
CT 42 BG 1	Norfolk	1
CT 42 BG 2	Norfolk	1
CT 43 BG 1	Norfolk	1
CT 43 BG 2	Norfolk	1
CT 43 BG 3	Norfolk	1
CT 43 BG 4	Norfolk	1
CT 44 BG 1	Norfolk	1
CT 44 BG 2	Norfolk	3
CT 44 BG 3	Norfolk	1
CT 45 BG 1	Norfolk	3
CT 46 BG 1	Norfolk	1
CT 46 BG 2	Norfolk	1
CT 47 BG 1	Norfolk	3
CT 47 BG 2	Norfolk	1
CT 48 BG 1	Norfolk	1
CT 49 BG 2	Norfolk	3
CT 5 BG 1	Norfolk	1
CT 5 BG 4	Norfolk	2
CT 50 BG 1	Norfolk	1
CT 50 BG 2	Norfolk	1
CT 50 BG 3	Norfolk	1
CT 51 BG 1	Norfolk	3
CT 51 BG 2	Norfolk	1
CT 51 BG 3	Norfolk	1
CT 55 BG 1	Norfolk	1
CT 55 BG 2	Norfolk	1
CT 55 BG 3	Norfolk	1
CT 56.02 BG 2	Norfolk	1
CT 57.01 BG 1	Norfolk	1
CT 57.01 BG 2	Norfolk	1
CT 57.01 BG 3	Norfolk	1
CT 57.02 BG 1	Norfolk	1
CT 57.02 BG 2	Norfolk	3
CT 58 BG 1	Norfolk	1
CT 58 BG 2	Norfolk	1
CT 58 BG 3	Norfolk	3
CT 59.01 BG 1	Norfolk	3
CT 59.01 BG 2	Norfolk	1
CT 59.01 BG 3	Norfolk	1
CT 59.02 BG 1	Norfolk	3
CT 59.02 BG 2	Norfolk	3
CT 59.02 BG 4	Norfolk	1

Census Tract & Block Group ID	Place Name	Category
CT 59.03 BG 1	Norfolk	1
CT 6 BG 1	Norfolk	3
CT 6 BG 3	Norfolk	1
CT 60 BG 1	Norfolk	1
CT 60 BG 2	Norfolk	1
CT 61 BG 1	Norfolk	1
CT 61 BG 2	Norfolk	3
CT 61 BG 3	Norfolk	1
CT 61 BG 4	Norfolk	3
CT 61 BG 5	Norfolk	2
CT 62 BG 1	Norfolk	3
CT 62 BG 2	Norfolk	2
CT 64 BG 1	Norfolk	3
CT 64 BG 2	Norfolk	1
CT 65.01 BG 1	Norfolk	2
CT 65.01 BG 2	Norfolk	2

Census Tract & Block Group ID	Place Name	Category
CT 65.02 BG 2	Norfolk	1
CT 66.05 BG 2	Norfolk	1
CT 66.06 BG 1	Norfolk	1
CT 66.06 BG 3	Norfolk	1
CT 66.07 BG 1	Norfolk	3
CT 66.07 BG 2	Norfolk	2
CT 69.01 BG 1	Norfolk	3
CT 69.01 BG 2	Norfolk	3
CT 69.01 BG 3	Norfolk	3
CT 69.02 BG 1	Norfolk	1
CT 70.01 BG 1	Norfolk	1
CT 70.02 BG 1	Norfolk	1
CT 70.02 BG 2	Norfolk	3
CT 8 BG 2	Norfolk	1
CT 9.01 BG 1	Norfolk	2
CT 9.02 BG 1	Norfolk	2

Table G-EJ24. Census Tracts (CT) and Block Groups (BG) in Newport News, Virginia (County ID 51-700) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.
Note that Newport News is an independent city in Virginia and is considered the equivalent of a county.

Census Tract & Block Group ID	Place Name	Category
CT 301 BG 1	Newport News	1
CT 301 BG 2	Newport News	1
CT 301 BG 3	Newport News	1
CT 303 BG 1	Newport News	1
CT 303 BG 2	Newport News	3
CT 303 BG 3	Newport News	1
CT 303 BG 4	Newport News	1
CT 303 BG 5	Newport News	1
CT 303 BG 6	Newport News	1
CT 303 BG 7	Newport News	3
CT 304 BG 1	Newport News	1
CT 304 BG 2	Newport News	1
CT 304 BG 3	Newport News	1
CT 304 BG 4	Newport News	1
CT 305 BG 1	Newport News	1
CT 305 BG 2	Newport News	1
CT 306 BG 1	Newport News	1
CT 306 BG 2	Newport News	1
CT 306 BG 3	Newport News	1
CT 308 BG 1	Newport News	1
CT 308 BG 2	Newport News	1
CT 308 BG 3	Newport News	1
CT 309 BG 1	Newport News	1
CT 309 BG 2	Newport News	1
CT 311 BG 1	Newport News	1
CT 311 BG 2	Newport News	1

Census Tract & Block Group ID	Place Name	Category
CT 312 BG 1	Newport News	2
CT 312 BG 2	Newport News	1
CT 313 BG 1	Newport News	1
CT 313 BG 2	Newport News	1
CT 313 BG 3	Newport News	1
CT 313 BG 4	Newport News	1
CT 314 BG 3	Newport News	3
CT 314 BG 4	Newport News	1
CT 315 BG 1	Newport News	2
CT 316.01 BG 2	Newport News	1
CT 316.01 BG 3	Newport News	1
CT 316.02 BG 1	Newport News	1
CT 317.01 BG 1	Newport News	1
CT 317.01 BG 2	Newport News	2
CT 319.02 BG 1	Newport News	3
CT 319.02 BG 3	Newport News	1
CT 320.06 BG 1	Newport News	1
CT 320.06 BG 2	Newport News	1
CT 320.06 BG 3	Newport News	1
CT 320.07 BG 1	Newport News	3
CT 320.07 BG 2	Newport News	3
CT 321.13 BG 1	Newport News	1
CT 321.17 BG 2	Newport News	2
CT 321.23 BG 1	Newport News	1
CT 321.23 BG 2	Newport News	3
CT 321.23 BG 3	Newport News	2

Census Tract & Block Group ID	Place Name	Category
CT 321.24 BG 1	Newport News	1
CT 321.24 BG 2	Newport News	3
CT 321.26 BG 1	Newport News	1
CT 321.26 BG 2	Newport News	1
CT 321.27 BG 1	Newport News	2
CT 321.27 BG 2	Newport News	3
CT 321.27 BG 3	Newport News	1
CT 321.28 BG 1	Newport News	3
CT 321.28 BG 2	Newport News	1
CT 321.29 BG 1	Newport News	3
CT 321.29 BG 2	Newport News	1
CT 321.31 BG 1	Newport News	3
CT 321.31 BG 3	Newport News	1
CT 321.32 BG 4	Newport News	3
CT 322.11 BG 3	Newport News	3
CT 322.12 BG 1	Newport News	1
CT 322.12 BG 2	Newport News	3
CT 322.12 BG 3	Newport News	1
CT 322.23 BG 1	Newport News	3
CT 322.23 BG 2	Newport News	3
CT 322.23 BG 3	Newport News	3
CT 322.24 BG 1	Newport News	1
CT 322.24 BG 2	Newport News	1
CT 322.24 BG 3	Newport News	3
CT 322.24 BG 4	Newport News	3
CT 322.25 BG 1	Newport News	1
CT 322.25 BG 2	Newport News	1
CT 322.26 BG 1	Newport News	1
CT 322.26 BG 2	Newport News	1
CT 323 BG 2	Newport News	1
CT 323 BG 3	Newport News	1
CT 324 BG 1	Newport News	1
CT 324 BG 2	Newport News	1

Table G-EJ25. Census Tracts (CT) and Block Groups (BG) in Hampton, Virginia (County ID 51-650) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.
Note that Hampton is an independent city in Virginia and is considered the equivalent of a county.

Census Tract & Block Group ID	Place Name	Category
CT 101.03 BG 1	Hampton	3
CT 101.03 BG 3	Hampton	3
CT 101.04 BG 2	Hampton	2
CT 101.04 BG 4	Hampton	1
CT 101.04 BG 5	Hampton	1
CT 103.04 BG 1	Hampton	3
CT 103.04 BG 2	Hampton	3
CT 103.04 BG 3	Hampton	3
CT 103.06 BG 2	Hampton	1
CT 103.06 BG 3	Hampton	1
CT 103.07 BG 1	Hampton	3
CT 103.07 BG 2	Hampton	3
CT 103.09 BG 2	Hampton	3
CT 103.09 BG 3	Hampton	1
CT 103.1 BG 1	Hampton	3
CT 103.11 BG 1	Hampton	1
CT 103.11 BG 2	Hampton	3
CT 103.13 BG 1	Hampton	3
CT 103.13 BG 2	Hampton	1
CT 103.13 BG 3	Hampton	3
CT 103.13 BG 4	Hampton	1
CT 103.14 BG 1	Hampton	3
CT 103.14 BG 2	Hampton	1
CT 104 BG 1	Hampton	1
CT 104 BG 2	Hampton	1
CT 104 BG 3	Hampton	1
CT 104 BG 4	Hampton	1
CT 104 BG 5	Hampton	2
CT 105.01 BG 1	Hampton	1
CT 105.01 BG 2	Hampton	1
CT 105.01 BG 3	Hampton	1
CT 105.02 BG 1	Hampton	1
CT 105.02 BG 2	Hampton	1
CT 106.01 BG 1	Hampton	1
CT 106.01 BG 2	Hampton	1
CT 106.02 BG 1	Hampton	1
CT 106.02 BG 2	Hampton	1
CT 107.01 BG 1	Hampton	2
CT 107.01 BG 2	Hampton	1
CT 107.02 BG 1	Hampton	2
CT 107.02 BG 2	Hampton	1
CT 107.03 BG 2	Hampton	2
CT 108 BG 1	Hampton	1
CT 108 BG 2	Hampton	1
CT 109 BG 1	Hampton	1
CT 110 BG 1	Hampton	2
CT 110 BG 2	Hampton	1
CT 110 BG 3	Hampton	1
CT 112 BG 1	Hampton	1
CT 112 BG 2	Hampton	2
CT 112 BG 3	Hampton	2
CT 113 BG 1	Hampton	1

Census Tract & Block Group ID	Place Name	Category
CT 113 BG 2	Hampton	1
CT 114 BG 1	Hampton	1
CT 114 BG 2	Hampton	3
CT 116 BG 1	Hampton	1
CT 116 BG 2	Hampton	1
CT 116 BG 3	Hampton	1
CT 118 BG 1	Hampton	1
CT 118 BG 2	Hampton	1
CT 118 BG 3	Hampton	1

Census Tract & Block Group ID	Place Name	Category
CT 118 BG 5	Hampton	1
CT 118 BG 6	Hampton	3
CT 119 BG 1	Hampton	1
CT 119 BG 2	Hampton	3
CT 119 BG 3	Hampton	1
CT 120 BG 1	Hampton	1
CT 120 BG 2	Hampton	1

Table G-EJ26. Census Tracts (CT) and Block Groups (BG) in Portsmouth, Virginia (County ID 51-740) That Are Potential Environmental Justice Areas of Concern Due to Concentrations of Minority and/or Low-Income Populations

Category 1—low-income percentage exceeds the percentage for the county; Category 2—minority population exceeds the percentage for the county; Category 3—both low-income and minority populations exceed the percentages for the county.
Note that Portsmouth is an independent city in Virginia and is considered the equivalent of a county.

Census Tract & Block Group ID	Place Name	Category
CT 2103 BG 1	Portsmouth	3
CT 2103 BG 2	Portsmouth	2
CT 2105 BG 1	Portsmouth	1
CT 2106 BG 2	Portsmouth	2
CT 2109 BG 1	Portsmouth	3
CT 2111 BG 1	Portsmouth	1
CT 2111 BG 2	Portsmouth	1
CT 2114 BG 1	Portsmouth	1
CT 2114 BG 2	Portsmouth	1
CT 2115 BG 1	Portsmouth	1
CT 2115 BG 2	Portsmouth	1
CT 2116 BG 3	Portsmouth	2
CT 2117 BG 1	Portsmouth	3
CT 2117 BG 2	Portsmouth	1
CT 2117 BG 3	Portsmouth	1
CT 2118 BG 1	Portsmouth	1
CT 2118 BG 2	Portsmouth	1
CT 2118 BG 3	Portsmouth	1
CT 2118 BG 4	Portsmouth	1
CT 2119 BG 1	Portsmouth	1
CT 2119 BG 2	Portsmouth	3
CT 2120 BG 1	Portsmouth	1
CT 2120 BG 2	Portsmouth	1
CT 2121 BG 1	Portsmouth	1
CT 2121 BG 2	Portsmouth	1
CT 2123 BG 1	Portsmouth	1
CT 2123 BG 2	Portsmouth	3
CT 2123 BG 3	Portsmouth	3

Census Tract & Block Group ID	Place Name	Category
CT 2123 BG 4	Portsmouth	1
CT 2124 BG 1	Portsmouth	1
CT 2124 BG 2	Portsmouth	3
CT 2124 BG 3	Portsmouth	1
CT 2125 BG 1	Portsmouth	1
CT 2126 BG 1	Portsmouth	1
CT 2126 BG 2	Portsmouth	2
CT 2127.01 BG 1	Portsmouth	1
CT 2127.01 BG 2	Portsmouth	3
CT 2127.01 BG 3	Portsmouth	3
CT 2127.01 BG 4	Portsmouth	3
CT 2127.02 BG 1	Portsmouth	3
CT 2127.02 BG 2	Portsmouth	1
CT 2128.01 BG 2	Portsmouth	1
CT 2128.01 BG 3	Portsmouth	3
CT 2129 BG 2	Portsmouth	2
CT 2129 BG 3	Portsmouth	2
CT 2131.01 BG 1	Portsmouth	1
CT 2131.01 BG 2	Portsmouth	1
CT 2131.01 BG 3	Portsmouth	3
CT 2131.03 BG 3	Portsmouth	3
CT 2131.03 BG 4	Portsmouth	3
CT 2131.03 BG 5	Portsmouth	3
CT 2131.04 BG 1	Portsmouth	3
CT 2131.04 BG 2	Portsmouth	3
CT 2132 BG 1	Portsmouth	3
CT 2132 BG 2	Portsmouth	1
CT 9801 BG 1	Portsmouth	3

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Electromagnetic Fields

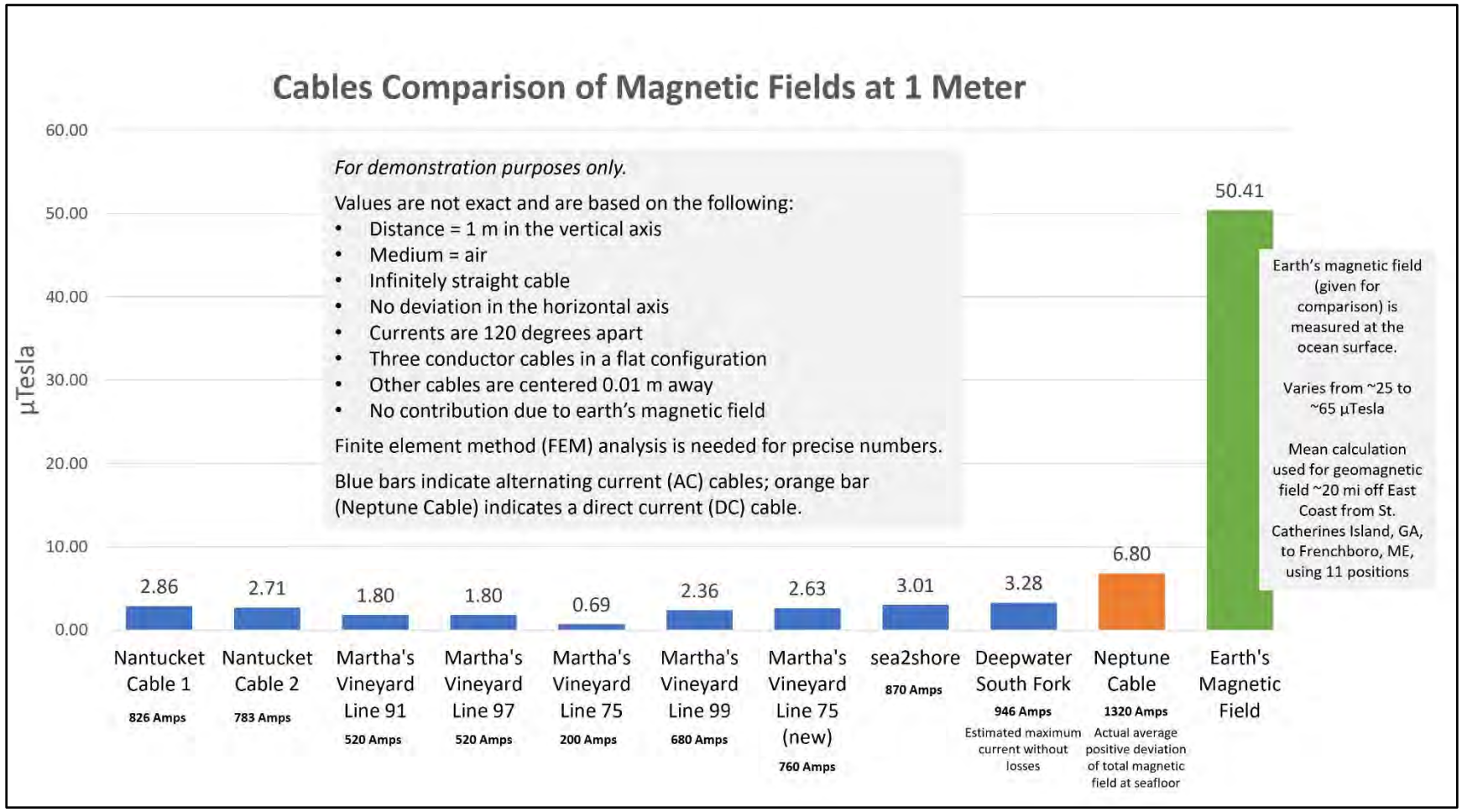

Figure G-34. Comparison of electromagnetic fields produced by offshore wind farm transmission cables to the Earth's background magnetic field.

Visual Resources

Visual resources impacts associated with the RWF were evaluated and determined based on information and findings associated with the RWF visual impact assessment (VIA) (EDR 2021) and the application of BOEM's Assessment of *Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States* methodology (Sullivan 2021), also known as seascape, landscape, and visual impacts assessment (SLVIA). At the request of BOEM, the SLVIA methodology for determination of impacts to key observation points (KOPs) (comprising the VIA component of the SLVIA) and impacts to character areas (ocean [OCA], seascapes [SCA] and landscapes [LCA]) (comprising the seascape and landscape impacts assessment [SLIA] component of the SLVIA) was applied (Sullivan 2021:29–33) to previously documented evaluation and impact methodologies associated with the RWF VIA.

The SLVIA impact methodology was crosswalked with the RWF VIA to extract previously documented existing views and proposed Project visual conditions and information associated with the Proposed Action (Table G-40 and G-41). KOP information and character area information associated with the 2021 Visual Impact Assessment was also extracted and applied to Alternatives B, C, D, and E and compiled in Tables G-42 thru G-47 to provide a consistent baseline of information related to determination of impacts associated with KOPs and character areas in relation to the Proposed Action for comparison purposes.

Up to 37 viewing condition scenarios (e.g., daytime, sunset and nighttime) associated with 28 individual KOPs were evaluated for each action alternative associated with the VIA component of the SLVIA (VIA Tables G-40a thru G-40b, G-42, G-44a thru G-44b and G-46). Not all KOPs were evaluated for all action alternatives. The orientation of specific KOPs in relation to action alternatives were reviewed and selected for further analysis based on geographic proximity of each action alternative. Each table combines the sensitivity rating based on a location's susceptibility to change and its perceived value to society based on information from the RWF VIA as well as the magnitude rating consisting of size or scale of the change associated with the proposed Project, the geographic extent of the change, and the duration and reversibility of the change for each KOP, for an overall impact determination finding of major, moderate, minor, or negligible (Sullivan 2021), which correspond to impacts described in the EIS. Cumulative impacts associated with KOPs (VIA Table G-48) have been evaluated and identify the level of impact associated with the contribution of the Proposed Action to the No Action Alternative.

Impacts associated with the SLIA component of the analysis (SLIA Tables G-41a thru G-41e, G-43a thru G-43c, G-45a thru G-45c and G-47a thru G-47c) crosswalk and categorize landscape similarity zones as described in the RWF VIA with SLVIA character area descriptions to provide a general understating of OCA, SCA and LCA relationships. Visibility analyses to determine the overall character area visibility associated with each alternative in comparison to the Proposed Action to provide a basis for impact determination is included in each table. Impacts to Specially Designated Areas have also been included in each SLIA table and categorized based on Specially Designated Area type.

Impact findings are based on the best available information associated with the RWF VIA for the action alternatives, and some deviation between the RWF VIA impact findings and the SLVIA impacts findings as applied in the following tables may occur due to differences in methodological approaches.

Table G-40a. Visual Impact Assessment Impact Matrix for Alternative B (Proposed Action) (see Table G-40b for continuation table)

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Lighting Angle of Proposed Action Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLVIA Sensitivity Rating Rationale	SLVIA Sensitivity Rating (high, medium, low)
AI01	Brenton Point State Park	SCA/LCA	South-Southeast	34.9	Sidelit	VTL2	16.7/14.5	180	Landscape is characteristic of recreational development; seascape appears intact	Low	Local Residents, Tourists/Vacationers, Fishing Community Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District, Ocean Drive National Historic Landmark	High	Popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing.	Medium
AI01	Brenton Point State Park - Night	SCA/LCA	South-Southeast	34.9	N/A	VTL2	16.7/14.5	180	Night seascape appears intact	Medium	Local Residents, Tourists/Vacationers, Fishing Community Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District, Ocean Drive National Historic Landmark	High	Popular destination for residents and tourists who enjoy sightseeing.	High
AI03	Newport Cliff Walk	SCA/LCA	Southeast to South-Southeast	22.8	Sidelit	VTL3	15.3/13.3	180	Landscape is characteristic of natural areas and minimal recreational development; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark	High	Popular among residents and tourists, particularly during the summer season. No other human-made features are visible.	High
AI05	Sachuest Point National Wildlife Refuge	LCA	South-Southeast	21.7	Variable	VTL4	14.8/12.9	180	Landscape is characteristic of natural areas and minimal recreational development; seascape appears intact	Medium	Local Residents, Tourists/Vacationers; Educational, Birders Sachuest Point National Wildlife Refuge, Sachuest Point State Scenic Area	High	Popular destination for hikers, fishermen, and nature enthusiasts, particularly birders	High
AI06	Sachuest Beach (Second Beach)	SCA	South-Southeast to South	10.2	Sidelit	VTL3	16.0/13.9	160	Landscape is characteristic of minimal shoreline recreational development; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Sachuest Beach (Second Beach), Narragansett Bay	Medium	Residents and vacationers regularly use Second Beach, particularly during the summer.	Medium
AI07	Hanging Rock (Norman Bird Sanctuary)	LCA	Southeast to South-Southeast	67.3	Backlit	VTL5	16.2/14.1	160	Landscape has infrastructure development and recreational development; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Norman Bird Sanctuary, Paradise Avenue and Associated Roads, State Scenic Byway, Second Beach, Paradise Rocks Rhode Island Historic District	High	Popular destination for residents and tourists who enjoy birdwatching, sightseeing, recreating, and sunbathing.	High
BI04	Southeast Lighthouse	SCA	East	161.1	Sidelit	VTL2	15.3/13.3	180	Landscape has characteristic historic lighthouse setting with supporting development; BIWF is visible (3 miles)	High	Local Residents, Tourists/Vacationers Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area	High	Maintenance of views from historic landmark and scenic area; user groups	High

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Lighting Angle of Proposed Action Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLVIA Sensitivity Rating Rationale	SLVIA Sensitivity Rating (high, medium, low)
BI04	Southeast Lighthouse - Night	SCA	East	161.1	N/A	VTL 4	15.3/13.4	180	Night seascape appears intact	High	Local Residents, Tourists/Vacationers Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area	High	Maintenance of views from historic landmark and scenic area; user groups	High
BI12	Clayhead Trail	SCA	East	78.8	Sidelit	VTL1	15.9/13.8	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	Medium	Tourists/Vacationers, Local Residents Clayhead Trail State Scenic District; Clay Head Preserve	High	Clayhead Trail State Scenic District; popular destination for residents and tourists who enjoy sightseeing and recreating.	High
BI13	North Light	SCA	East	27.5	Backlit	VTL4	17.2/15.0	160	Landscape has compatible residential and recreational development; seascape appears intact	Moderate	Tourists/Vacationers, Local Residents North Light National Register Historic Property, Beach Plum Neck/North Light State Scenic Area, Corn Neck Road Historic District (NRE)	High	Remote and private scenic/historic experience set among dune landforms and dense dune vegetation.	High
CI01	Cuttyhunk Island	SCA	South to Southwest	151.3	Backlit	VTL5	13.9/12.1	180	Landscape has compatible residential and recreational development; seascape appears intact	High	Local Residents, Tourists/Vacationers Elizabeth Islands State Scenic Area, Buzzards Bay	High	Cuttyhunk is a remote island, which hosts a small number of year-round residents and a large influx of tourists during the summer months.	High
C01	Beavertail Lighthouse	SCA	Southeast to South-Southeast	27.5	Sidelit	VTL1	18.4/15.9	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	Low	Local Residents, Tourists/Vacationers National Register Historic Site, Beavertail Point Scenic Area, Rhode Island Historic District, Beavertail State Park	High	Popular destination for residents and tourists who enjoy sightseeing, recreating, fishing, and sunbathing.	Medium
LI04	Montauk Point State Park	SCA/LCA	East	48.0	Sidelit	VTL1	31.5/27.4	90	Landscape has characteristic historic lighthouse setting with supporting compatible development; BIWF is visible (approximately 17 miles)	Low	Local Residents, Tourists/Vacationers, Fishing Community Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance	High	Montauk Point Scenic Area of Statewide Significance; Montauk State Park is a popular destination for local residents and tourists/vacationers. Year-round outdoor recreational opportunities include wildlife viewing and photography.	Medium
LI04	Montauk Point State Park - Night	SCA/LCA	East	48.0	N/A	VTL2	31.5/27.4	40	Night seascape influenced by existing BIWF lighting	Medium	Local Residents, Tourists/Vacationers, Fishing Community Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance	High	Montauk Point Scenic Area of Statewide Significance; Montauk State Park is a popular destination for local residents and tourists/vacationers. Year-round outdoor recreational opportunities include wildlife viewing and photography.	High

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Lighting Angle of Proposed Action Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLVIA Sensitivity Rating Rationale	SLVIA Sensitivity Rating (high, medium, low)
MM01	Gooseberry Island	LCA	South to South-Southwest	16.0	Backlit	VTL4	15.1/13.2	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Horseneck Beach State Reservation, Westport South Dartmouth Unit State Scenic Area, Buzzards Bay	Medium	Buzzards Bay is near Gooseberry Public Beach, south of Horseneck Beach State Reservation on the mainland, and within the Westport South Dartmouth State Scenic Area.	Medium
MM04	Nobska Lighthouse	SCA/LCA	South-Southwest to Southwest	53.7	Sidelit	VTL1	28.2/24.5	90	Landscape has characteristic historic lighthouse setting with supporting compatible development; seascape appears intact	Low	Local Residents, Tourists/Vacationers Nobska Lighthouse National Register Historic Site, Church Street/Nobska Point State Historic District, Nobska Beach Association Beach	High	Maintenance of views from historic landmark and scenic area; user groups	Medium
MV02	Philbin Beach	SCA	South-Southwest to West-Southwest	10.5	Variable	VTL5	13.6/11.8	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head West Tisbury Unit State Scenic Area, Philbin Beach	High	A popular destination for residents and tourists who enjoy sightseeing, surfing, swimming, recreating, and sunbathing.	High
MV03	Lucy Vincent Beach	SCA	South-Southwest to Southwest	27.7	Backlit	VTL 3	15.5/13.5	90	Landscape has compatible residential and recreational development; seascape appears intact though occupied by beach users	Medium	Local Residents, Tourists/Vacationers Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach	High	Provides recreational opportunities for town residents including swimming, sunbathing, walking, nature viewing, fishing, and photography.	High
MV03	Lucy Vincent Beach - Sunset	SCA	South-Southwest to Southwest	27.7	Backlit	VTL 4	15.5/13.6	90	Landscape has compatible residential and recreational development; seascape appears intact with minimal influence of beach users	High	Local Residents, Tourists/Vacationers Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach	Medium	Provides recreational opportunities for town residents including walking, nature viewing, and photography. Evening / night less occupied	Medium
MV05	Moshup Beach	SCA	South-Southwest to West-Southwest	23.1	Variable	VTL 5	13.7/11.9	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head West Tisbury State Scenic Area, Moshup Beach	High	Popular public beach; open to residents and tourists and is a popular destination in the summertime.	High
MV05	Moshup Beach - Sunset	SCA	South-Southwest to West-Southwest	23.1	Backlit	VTL 5	13.7/11.10	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head West Tisbury State Scenic Area, Moshup Beach	High	Popular public beach; open to residents and tourists and is a popular destination in the summertime.	High
MV07	Aquinnah Overlook	SCA	South to Southwest	145.5	Sidelit	VTL 3	13.7/11.9	180	Landscape has compatible recreational development; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark	High	The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean, beach, shoreline bluffs, and natural vegetation.	High

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Lighting Angle of Proposed Action Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLVIA Sensitivity Rating Rationale	SLVIA Sensitivity Rating (high, medium, low)
MV07	Aquinnah Overlook - Sunset	SCA	South to Southwest	145.5	Backlit	VTL 5	13.7/11.10	180	Landscape has compatible recreational development; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark	High	The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean, beach, and shoreline bluffs.	High
MV07	Aquinnah Overlook - Night	SCA	South to Southwest	145.5	N/A	VTL 3	13.7/11.11	180	Night seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area, Gay Head Cliffs National Natural Landmark	High	The Aquinnah Overlook is a dedicated viewing platform, providing opportunities for sweeping views of the ocean.	High
MV09	Gay Head Lighthouse	SCA	South to West-Southwest	162.1	Sidelit	VTL 4	13.9/12.1	180	Landscape has characteristic historic lighthouse setting with supporting compatible development; seascape appears intact	High	Local Residents, Tourists/Vacationers Gay Head Lighthouse National Historic Landmark, Gay Head West Tisbury Unit State Scenic Area	High	Gay Head Lighthouse is a popular destination for residents and tourists interested in historic lighthouses and picturesque ocean views.	High
MV10	South Beach State Park	SCA	Southwest to West-Southwest	17.0	Sidelit	VTL3	22.0/19.1	160	Landscape is characteristic of intact natural shoreline; seascape appears intact other than single buoy on horizon	Moderate	Local Residents, Tourists/Vacationers South Beach State Park	High	The beach is a popular destination for local residents as well as tourists/vacationers, and is heavily utilized during the summer months for recreating, sunbathing, and surfing.	High
MV11	Wasque Point	SCA	West-Southwest	13.6	Backlit	VTL 2	24.8/21.5	140	Landscape is characteristic of intact natural shoreline; seascape appears intact	Low	Local Residents, Tourists/Vacationers Wasque Point	Medium	A variety of public lands used by residents and tourists/vacationers for hiking, sunbathing, beachcombing, and wildlife viewing.	Low
MV12	Peaked Hill Reservation	LCA	South-Southwest to Southwest	305.1	Backlit	VTL 1	16.3/14.2	180	Landscape is characteristic of intact, natural forested shoreline; seascape appears intact	Low	Local Residents, Tourists/Vacationers Identified by the Wampanoag of Gay Head	High	Location has particular cultural importance and is a popular destination for members of the Aquinnah Tribe of Gay Head.	High
MV12	Peaked Hill Reservation - Sunset	LCA	South-Southwest to Southwest	305.1	Backlit	VTL4	16.3/14.2	180	Landscape is characteristic of intact, natural densely forested shoreline; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Identified by the Wampanoag of Gay Head	High	Location has particular cultural importance and is a popular destination for members of the Aquinnah Tribe of Gay Head	High
MV13	Edwin DeVries Vanderhoop Homestead	SCA	South to Southwest	17.0	Backlit	VTL5	13.8/12.0	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	High	Local Residents, Tourists/Vacationers Edwin D. Vanderhoop Homestead National Register Historic Site, Head West Tisbury Unit State Scenic Resource	High	Large numbers of residents and tourists during the summer months while visiting the Aquinnah Cultural Center	Medium

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Lighting Angle of Proposed Action Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLVIA Sensitivity Rating Rationale	SLVIA Sensitivity Rating (high, medium, low)
NI10	Madaket Beach	SCA	West	20.6	Backlit	VTL1	34.6/30.0	60	Landscape has compatible recreational development; seascape appears intact	Low	Local Residents, Tourists/Vacationers Madaket Beach, Nantucket National Historic Landmark	High	Beach is a popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing.	Medium
NL01	Nomans Land Island NWR *(not occupied)*	SCA	West-Southwest	42.1	Sidelit	VTL5	8.7/7.5	180	Landscape is characteristic of intact natural shoreline/ bluffs; seascape appears intact; minimal human influence	Medium	No Access Nomans Land Island National Wildlife Refuge/ natural and intact	Low	Uninhabited island with intact seascape	Low
NL01	Nomans Land Island NWR - Sunset *(not occupied)*	SCA	West-Southwest	42.1	Backlit	VTL6	8.7/7.6	180	Landscape is characteristic of intact natural shoreline/ bluffs; seascape appears intact	High	No Access Nomans Land Island National Wildlife Refuge	Medium	Uninhabited island with intact seascape	Medium
RI01	Watch Hill Lighthouse	SCA/LCA	East-Southeast	24.1	Sidelit	VTL1	32.8/28.5	160	Landscape has compatible residential and recreational development; seascape appears intact	Low	Local Residents, Tourists/Vacationers Watch Hill National Register Historic District, Watch Hill State Scenic Area	High	Popular destination for residents and tourists who enjoy sightseeing, history, and recreating.	Medium
RI06	Trustom Pond NWR	SCA/LCA	Southeast	13.8	Backlit	VTL3	22.6/19.6	180	Landscape is characteristic of intact natural shoreline; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Trustom Pond/Matunuck State Scenic Area, Trustom Pond National Wildlife Refuge	Medium	Near the Trustom Pond/Matunuck State Scenic Area, and the Trustom Pond National Wildlife Refuge Public Beach.	Medium
RI08	Scarborough Beach State Park	SCA	Southeast	14.8	Backlit	VTL4	19.1/16.6	180	Landscape is characteristic of recreational shoreline development; seascape appears intact	Medium	Local Residents, Tourists/Vacationers Scarborough State Beach	Medium	Popular destination for residents and tourists who enjoy sightseeing, recreating, and sunbathing.	Medium
RI09	Narragansett Beach	SCA	Southeast	10.5	Backlit	VTL1	20.0/17.4	160	Landscape has compatible residential and recreational development; seascape appears intact	Low	Local Residents, Tourists/Vacationers Narragansett Town Beach	High	Very popular vacation destination and hosts large tourist crowds in the summer with up to 10,000 guests per day.	Medium

Table G-40b. Visual Impact Assessment Impact Matrix for Alternative B (Proposed Action)

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
AI01	Visibility of the entire RWF extends inland across public open space and into the adjacent Newport Country Club before breaking up into discrete areas of visibility of less than half of the WTGs due to screening provided by vegetation, structures, and topography.	Small	Number of turbines visible - 100 Percent visibility - 26%–50%	Medium	Long-term (30 years)/Reversible	Fair	Overall size and scale along with visibility reduces contrast and perceivability	Medium	Importance of recreation and historic resources, duration and visibility from KOP	Moderate

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
AI01	The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon.	Medium	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Large	Long-term (30 years)/Reversible	Fair	Prominence and dominance of warning lights in non-developed setting	Large	The addition of aviation warning lights along the horizon within the viewshed would detract from the overall nighttime environment.	Major
AI03	Project will not be conspicuous to casual observers from this KOP, and the unique rock features in the foreground will remain the focal point in this view.	Medium	Majority of turbines visible - 100 Percent visibility - 51%–75%	Medium	Long-term (30 years)/Reversible	Fair	Overall size and scale along with visibility reduces contrast and perceivability	Medium	Importance of recreation and historic resources; proximity of residential viewers, duration, and visibility from KOP	Moderate
AI05	Project will be prominent in dramatic 180-degree open views and appears wild and undisturbed with open view of the ocean framed by boulders in the foreground.	Large	Number of turbines visible - 100 Percent visibility - 26%–50%	Medium	Long-term (30 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of natural landscape and natural recreation opportunities, scenic values in a preserved seascape; prominence of turbines	Major
AI06	Turbines, are noticeable but are not spatially dominant.	Medium	Number of turbines visible - 99 Percent visibility - 51%–75%	Medium	Long-term (30 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Medium	Importance of recreation along intact shoreline; turbines will be visible along horizon, although will not be a dominant feature in the seascape	Moderate
AI07	Existing foreground built features attract attention initially, although turbines across the horizon become a dominant focal point of the view.	Large	Number of turbines visible - 100 Percent visibility - 2%–25%	Medium	Long-term (30 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of natural landscape and natural recreation opportunities, scenic values associated with byway; prominence of turbines	Major
BI04	Highly visible and likely to attract the attention of lighthouse visitors based on lighting conditions, although not as prominent as the existing BIWF.	Medium	Majority of turbines visible - 97 Percent visibility - 26%–50%	Medium	Long-term (30 years)/Reversible	Fair	Visibility based on lighting conditions, existing BIWF visibility, duration	Medium	Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions	Moderate
BI04	The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon.	Large	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Large	Long-term (30 years)/Reversible	Fair	Visibility based on lighting conditions, existing BIWF visibility, duration	Large	Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions	Major

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
BI12	Visible and likely to attract attention resulting from angle of view of WTGs	Medium	Number of turbines visible - 100 Percent visibility - 51%–75%	Medium	Long-term (30 years)/Reversible	Fair	Visibility of WTGs within viewshed along horizon line within viewshed	Medium	Importance of preservation of scenic district and uses; proximity and visibility of Project	Moderate
BI13	Turbines become the focus of views out to the water and the tight spacing and numerous turbines along the horizon draw the viewers' eye away from natural features.	Large	Number of turbines - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of recreation and historic resources; proximity of residential viewers, duration and visibility from KOP	Moderate
CI01	Turbines and OSS facilities would begin to dominate the horizon and are uncharacteristic of existing conditions.	Large	Number of turbines visible - 99 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Prominence and dominance of turbines in non-developed setting	Large	Importance of recreation and historic resources; size, scale, and visibility from KOP	Major
C01	Turbines are perceivable along horizon line, although the degree of change from existing condition would be minor.	Small	Number of turbines visible - 100 Percent visibility - 51%–75%	Medium	Long term (35 years)/Reversible	Fair	Overall size and scale along with visibility reduces contrast and perceivability	Small	Importance of recreation and historic resources; size, scale and visibility from KOP	Minor
LI04	Due to distance and viewer position in relation to other features in the landscape, there would be minor change in the existing condition.	Small	Number of turbines visible - 91 Percent visibility - 51%–75%	Medium	Long term (35 years)/Reversible	Fair	Project would not be perceivable along horizon due to distance and atmospheric influences	Small	Project would not be perceivable along horizon due to distance and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting.	Negligible
LI04	Due to distance and viewer position in relation to other features in the landscape, there would be minor change in the existing condition.	Small	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Small	Long term (35 years)/Reversible	Fair	Project would be perceivable along horizon if observer views were focused toward lighting	Small	The addition of aviation warning lights along the horizon within the viewshed would be perceivable by the focused viewer, but not a dominant element as compared to other existing warning lighting sources associated with BIWF that are in closer proximity (approximately 16 miles).	Negligible
MM01	Visible and likely to attract the attention resulting from angle of view of WTGs	Medium	Number of turbines visible - 100 Percent visibility - 76%–100%	Medium	Long term (35 years)/Reversible	Fair	Project blades would be perceivable along horizon	Medium	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	Minor
MM04	Degree of change in existing conditions would be minimal due to distance and existing modifications within the foreground.	Small	Number of turbines visible - 90 Percent visibility - 51%–75%	Medium	Long term (35 years)/Reversible	Fair	Distance to project, natural and human-made features in the foreground would reduce magnitude	Small	Importance of natural landscape and recreation opportunities; distance of turbines in relation to KOP	Minor

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
MV02	Turbines are very visible on the horizon line and will dominate the view from the KOP.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	Moderate
MV03	Visible and likely to attract the attention resulting from angle of view of WTGs	Medium	Number of turbines visible - 59 Percent visibility - 76%–100%	Medium	Long term (35 years)/Reversible	Fair	Visibility of WTGs within viewshed along horizon line within viewshed	Medium	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	Moderate
MV03	WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the proposed Project.	Large	Number of turbines visible - 59 Percent visibility - 76%–100%	Medium	Long term (35 years)/Reversible	Fair	Visibility of backlit WTGs within viewshed along horizon line within viewshed	Large	Scenic values; prominence of turbines- sunset backlighting of turbines along with movement influences prominence	Major
MV05	With the proposed RWF in place, the nacelles and rotors from numerous WTGs and two OSSs will be visible from this KOP in the background along the horizon.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	Moderate
MV05	WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the proposed Project.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Visibility of backlit WTGs within viewshed along horizon line within viewshed	Large	Scenic values; prominence of backlit turbines on the horizon	Major
MV07	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Prominent, dedicated viewpoint	Major
MV07	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Prominent, dedicated viewpoint	Major
MV07	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Prominent, dedicated viewpoint; warning lighting appears low on the horizon	Major

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
MV09	The two OSSs appear as dark elements on the horizon suspended above the water surface. From this superior vantage point, the entirety of the Project is visible.	Large	Number of turbines visible - 70 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of historic lighthouse, scenic values; prominence of turbines and OSSs	Major
MV10	Nacelles and rotors from numerous WTGs will be visible in the background along the horizon. Turbines are visible on the horizon and provide a focal point.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Medium	Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon	Moderate
MV11	Nearest WTG is 24.6 miles (39.6 km) away; the towers are largely obscured due to curvature of the Earth, with their degree of exposure decreasing from left to right.	Medium	Number of turbines visible - 89 Percent visibility - 2%–25%	Moderate	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Medium	Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance and percentage of visibility	Minor
MV12	KOP on Peaked Hill represents a discrete view to the southwest that requires the viewer to be perfectly positioned.	Small	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Small Based on simulation graphic all are visible / vegetation and perspective influence	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions, vegetation and viewer perspective	Small	Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to intervening vegetation and landforms	Major
MV12	Sunset illumination and backlighting influences change	Large	Number of turbines visible - Percent visibility - % Information not available in RWF VIA	Large Based on simulation graphic all are visible / vegetation and perspective influence	Long term (35 years)/Reversible	Fair	Backlighting of WTGs, increased visibility	Large	Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to backlighting	Major
MV13	WTGs are visible; light gray towers, nacelles, and rotors are fully visible above the horizon.	Large	Number of turbines visible - 100 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance and percentage of visibility	Major
NI10	WTGs are barely visible along the horizon, with a small cluster of turbine blades and nacelle comprising the majority of visible features.	Small	Number of turbines visible - 26 Percent visibility - 76%–100%	Small (distance)	Long term (35 years)/Reversible	Fair	Not perceivable at distance.	Small	Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance	Minor

KOP Number	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Geographic Extent Rationale (Appendix A COP VIA)	Geographic Extent Rating (large, medium, small)	Duration/Reversibility Rationale	Duration/Reversibility Rating (good, fair, poor)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
NL01	WTGs appear as gray vertical lines against the yellow backdrop of the sky that look out of character with the vast extent of open water.	Large	Number of turbines visible - 100 Precent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Intact seascape and prominence of WTGs in close proximity, although no viewers	Major
NL01	Sunset illumination and backlighting influences change	Large	Number of turbines visible - 100 Precent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Backlighting of WTGs, increased visibility	Large	Intact seascape and prominence of WTGs, although no viewers; backlighting of WTGs and OSS	Major
RI01	WTGs are barely visible from this location due largely to their distance from the viewer and the screening effects of curvature of the Earth.	Small	Number of turbines visible - 89 Percent visibility - 26%–75%	Small (Distance)	Long term (35 years)/Reversible	Fair	Not perceivable at distance.	Small	Importance of historic setting and natural recreation opportunities; visibility of WTGs due to distance	Minor
RI06	Upper portions of the WTGs are perceptible as slender gray protrusions above the horizon line.	Medium	Number of turbines visible - 99 Percent visibility - 2%–25%	Medium	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Medium	Intact seascape and presence of WTGs along horizon	Minor
RI08	Nacelles and rotors of numerous WTGs are visible along the horizon, distance	Medium	Number of turbines visible - 99 Percent visibility - 76%–100%	Large	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Large	Importance of recreation opportunities; visibility of WTGs due to distance and percentage of visibility	Moderate
RI09	WTGs will be visible along the horizon; distance	Medium	Number of turbines visible - 99 Percent visibility - 26%–50%	Medium	Long term (35 years)/Reversible	Fair	Size and scale in relation to existing conditions along with percentage of visibility	Medium	Importance of recreation opportunities; visibility of WTGs due to distance and percentage of visibility	Moderate

Table G-41a. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) - Seascape Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Shoreline Beach	SCA	AI06, MV02, MV10, MV11, NI10, RI08, RI09	Unobstructed, expansive water-level view of the shoreline and across open water	High	Viewer activity in this area is primarily recreational, including swimming, sunbathing, walking, beachcombing, fishing, and surfing. Examples include Watch Hill, Narragansett, Horseneck, and Sachuest Beaches.	High	Iconic eastern shore beach setting with intermixed characteristic built features. Open ocean adjacency.	High	35.3/ 2.4	Small	Prominence of WTGs based on adjacency of open water to character area, with uninterrupted views to horizon and Project.	Large	Long term (35 years)/ Reversible	Fair	Overall visible land area in comparison with prominence of Project and duration of time	Medium	Predominately high sensitivity along with medium degree of magnitude	Moderate
Coastal Bluff	SCA	BI04, BI12, C01, MV07, MV13, NL01	Elevated views; Because of elevation and lack of tall vegetation, these views typically include significant lengths of shoreline and a broad expanse of open ocean as well as typical inland features. Views are generally only available from discrete public access points and trails.	Medium	Discrete, elevated views along visually variable landscape. Includes the south shore of Block Island including the Clayhead Trail in New Shoreham, at Gay Head in Aquinnah on Martha's Vineyard, along portions of the Cliff Walk in Newport, and at Montauk Point on Long Island.	High	Iconic eastern shore cliff and bluff setting with open ocean adjacency.	High	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Developed Waterfront	SCA	N/A	Dominance of human-made features including docks, boats, and shoreline buildings/structures	Low	Fishing ports, harbors, marinas, and shoreline commercial and industrial areas	Medium	Activity in these areas is generally water-oriented but highly variable and includes commercial fishing, seafood processing, boat repair, pleasure boating, retail shopping, and restaurants.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Shoreline Residential	SCA	AI03, RI01	Shoreline homes are specifically situated to take advantage of water views.	High	Year-round and seasonal homes situated along the ocean shoreline. The defining characteristic of this zone is a broad, often elevated, view of the ocean from a residential setting.	High	Home are positioned and occupied for the appeal of iconic oceanside views.	High	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Coastal Dunes	SCA	BI13, MV03, MV05	Views from the dunes are largely restricted to these paths and typically screened by the tight, rolling landform until	Medium	Coastal dunes are typically strictly regulated ecological communities, and access is limited to narrow,	Medium	Viewer activity in this area is almost exclusively recreational and typically focused on sightseeing	Medium	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
			emerging at the top of the beach.		enclosed footpaths and boardwalks that cut through or over the dunes, providing public access to the beaches.		and beach access.											

Table G-41b. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) - Seascape Character Areas and Landscape Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Salt Pond/ Tidal Marsh	SCA/LCA	RI06	Views are available across the open water but are generally interrupted by adjacent dunes, barrier spits, and/or scrub vegetation that separates the ponds and the adjacent land from the ocean.	Low	Residences often occur along the edges of these ponds, as indicated by docks and boats along their shorelines. Recreational activity in the form of boating, fishing, and clamming is common in these areas.	Medium	Multi-use setting with localized views, increased distance from the open ocean.	Medium	35.3/ 2.4	Small	Intermix of vegetation, topography, and viewer position in relation to Project begins to influence the degree to which Project is perceived.	Medium	Long term (35 years)/ Reversible	Fair	Overall visible land area in comparison with prominence of Project and duration of time	Medium	Combination of high, medium, and low sensitivity (combined for and overall medium) along with medium degree of magnitude	Moderate
Inland Lakes and Ponds	SCA/ LCA	N/A	The dominant visual feature of this zone is an open expanse of flat water that is enclosed by a	Low	Given their locations and surrounding screening, views to the ocean are relatively rare.	Low	Views are constrained within immediate area with ocean views	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
			vegetated shoreline. Occasionally interrupted by human-made features, such as homes and boat launches		Human activity on the lakes and along the shoreline includes boating, fishing, and swimming.		obscured by vegetation.											
Maintained Recreation Area	SCA/LCA	AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01	Views of the ocean are highly variable, depending on the proximity to the shoreline. The open, maintained landscape generally allows for expansive, unobstructed views of the surrounding seascape.	High	Recreation focused with open lawns at public parks, lighthouses, USCG stations, and golf courses. Lighthouses and state parks are often associated.	High	Iconic settings, with lighthouses, open ocean views with a recreation focus	High	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Highway Transportation	SCA/LCA	N/A	High-volume vehicular travel corridors that traverse the landscape and are dominated by automobiles. Travel is at moderate to high speed, and outward peripheral views are fleeting.	Low	Dominated by adjacent buildings/structures and trees with limited elevated long-distance views available.	Medium	Viewer focus is associated with driving activity and with limited duration views.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Table G-41c. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) - Landscape Character Areas

Character Area Name	Character Area Association (SCA/LCA/ OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Coastal Scrub/ Shrub Forest	LCA	AI05, AI07, CI01, MM01,	Outward views are largely enclosed by surrounding vegetation and are limited to the orientation and width of the cleared corridor.	Low	Viewer activity is primarily local travel and recreational trail use.	Medium	Views are constrained within the immediate area with ocean views obscured by vegetation.	Low	35.3/ 2.4	Small	As distance from Project increases, the degree to which Project is noticeable decreases due to the influence of the built and naturally vegetated environment associated with these character areas.	Medium/ Small	Long term (35 years)/ Reversible	Fair	Overall visible land area in comparison with prominence of Project and duration of time	Medium	Overall low sensitivity with medium degree of magnitude	Minor
Agricultural/ Open Field	LCA	N/A	Open farmland provides for long-distance views in this zone; adjacent forest, coastal scrub, and buildings/structures typically frame/enclose these views and provide significant screening.	Low	Occurs primarily inland of the coast, views to the ocean are relatively rare.	Low	Setting is not influenced by views of the ocean, and pastoral/agricultural character dominates.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Forest	LCA	MV12	Long-distance views within the zone are generally either fully or partially screened by vegetation and, when present, are tightly enclosed by the surrounding trees.	Low	Variable vegetation characteristics in relation to typical ocean, seascape environment provides more enclosed setting for users.	Low	Views are constrained within the immediate area with ocean views obscured by vegetation.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Rural Residential	LCA	N/A	Rural residences tend to be located along narrow, tree-lined roads, with intervening vegetation. Long-distance views are largely restricted to small open fields.	Low	Typical viewer activity includes residential activity, outdoor recreation, and local travel.	Low	Views are constrained within the immediate area with ocean views obscured by vegetation.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Suburban Residential	LCA	N/A	Medium to high-density residential neighborhoods that typically occur on the outskirts of villages and town centers and along secondary roads and cul-de-sacs spurring off	Low	Views are generally limited by the surrounding forest vegetation, adjacent buildings/structures, and/or undulating topography that surrounds the subdivisions.	Low	Localized views and influence of built residential environment	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Land Acres within Analysis Area: 1,488.1 Square Miles	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
			the main roads.															
Village/ Town Center	LCA	N/A	Moderate to high-density residential and commercial development includes larger town center areas. Buildings (typically two- to three-stories tall) and other human-made features dominate the landscape.	Low	Outward views that are available will typically exist in areas on the outskirts of the villages and town centers and will generally be partially screened by existing buildings/structures and surrounding native vegetation.	Low	Localized views and influence of built environment	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Commercial	LCA	N/A	Commercial development along a highway includes retail businesses, restaurants, convenience stores, automobile dealers, shopping centers, and malls.	Low	Views are focused along the axis of the highway and the foreground is dominated by buildings, automobiles, paved roads, and parking lots.	Low	Urbanized built environment dominates and is the primary focus.	Low	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.

Table G-41d. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) - Ocean Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) *Alternative B - Proposed Action* *Total OCA area within Analysis Area: 6,113.4 Square Miles*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and Scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Open Ocean	OCA	N/A	Presence of open water as a dominant foreground element in all directions. Human-made features in the water are limited but may include occasional jetties, buoys, and boats.	High	Human activity on the water can be extensive, especially near major ports and navigation,	High	Presence of open ocean environment with unobstructed horizon is of high importance to users and visitors.	High	5,882.2 / 96.2 Maximum ocean visibility as compared to all alternatives	Large	Predominantly intact open ocean within immediate proximity of WTGs and OSS facilities not characteristic of the OCA	Large	Long term (35 years)/ Reversible	Fair	Proximity of OCA to Project with uninterrupted ocean views surrounding Project for duration of Project. Approximately 96% of OCA total acres with visibility.	Large	Intact open ocean setting, in immediate proximity of Project components for the duration of Project.	Major

Table G-41e. Seascape Landscape Impact Assessment for Alternative B (Proposed Action) - Specially Designated Areas

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Historic Sites and National Landmarks	12,308.0	AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01	161 districts and individual properties listed or eligible for the NRHP and 13 properties or districts listed as National Historic Landmarks (NHL). These include historic districts, homes, lighthouses, churches, and government buildings.	High	Properties have historic, regional and national significance.	High	Historic properties and sites generally have high than average sensitivity based on the nature of the property and its relationship to the setting.	High	1,222.08 / 9.9	Medium	General proximity of project in relation to sensitive resource and experiences associated with historic/ culturally significant locations.	Large	Long term (35 years)/ Reversible	Fair	General proximity of project in relation to sensitive resource and experiences associated with historic/ culturally significant locations.	Large	Importance of iconic sites, settings and experiences associated with locations in contrast to introduction of project.	Major

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
National Natural Landmarks	349.7	MV07	Sites that contain outstanding biological and geological resources and encourages the conservation of these areas.	Medium	Two locations identified within analysis area. Primary importance is related to physical resources, with lesser potential importance on experiences.	Medium	Preservation of physical resources associated with landmarks.	Medium	255.5 / 73.1	Large	Proximity of Gay Head Cliffs is approximate 14-miles from project. Muskeget Island is approximately 31.6 miles.	Medium	Long term (35 years)/ Reversible	Fair	Variable distances of resource from project.	Large	two identified localized resources with variable proximity to project and localized focus on physical resources.	Moderate
State Scenic Areas	105,777.6	BI12, CI01, MV07	93 state-designated scenic areas, including 56 in Rhode Island; 34 in Massachusetts; 3 in New York	High	Importance of iconic landscapes (ex. Martha's Vineyard) that surround the lease area.	High	Often associated with iconic settings and places which most often have regional and national significance related to sense of place.	High	18,205.6 / 17.2	Small	Overall percentage of visible areas and distribution of locations often in relative proximity to project.	Large	Long term (35 years)/ Reversible	Fair	Variability of visibility in relation to resource with approximately 1/4 of acres having visibility of project.	Medium	Overall higher sensitivity to change based on nature of resource and iconic landscapes.	Major
National Wildlife Refuges	15,176.1	AI05, NL01, RI06	System of public lands and waters set aside to conserve the nation’s fish, wildlife, and plants. Nine refuges occur within the analysis area.	Low	Preservation of natural resources specific to refuge.	Low	Preservation of physical resources associated with refuges.	Medium	767.7 / 5.1	Small	Percentage of visibility of project in relation to distributed areas and refuge locations	Small	Long term (35 years)/ Reversible	Fair	Minimal to no change to physical resource visually.	Small	Refuges are focused on the preservation of natural resources, with closest refuge not occupied by humans.	Minor
State/Non-Profit Wildlife Management Areas	31,967.8	AI07	18 State Wildlife Management Areas: nine in Rhode Island and nine in Massachusetts. Lands are managed to provide wildlife habitat and accommodate wildlife-related recreation (hunting, bird watching, etc.).	Low	Preservation of natural resources specific to management areas.	Low	Preservation of physical resources associated with management area. Variable uses and activities.	Medium	1,31.4 / .4	Small	Small percentage of project visibility.	Small	Long term (35 years)/ Reversible	Fair	Minimal to no change to physical resource visually.	Small	Management areas are focused on the preservation of natural resources and providing recreation resources.	Minor
National Parks	31.2	N/A	New Bedford Whaling National Historical Park,	Low	Associated with historical maritime activities,	Low	Higher sensitivity as a result of	Medium	.2 / .7	Small	Overall distance from project is approximately	Small	Long term (35 years)/ Reversible	Fair	No perceivable change	Small	Importance as a National Park, though physically	Negligible

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
			New Bedford, Massachusetts. Approximately 26-miles from project.		localized interest.		National Park designation				26 miles with one WTG visible.				related to project		distanced from project to have negligible impacts or visibility.	
State Parks	10,473.8	AI01, LI04, MV10, RI08	17 State parks and reservations that occur within the analysis area and provide recreation and sight-seeing opportunities.	Medium	Variable recreation sites and opportunities for local and national interests.	Medium	Importance of recreation destinations and associated ocean viewing opportunities.	High	2,731.7 / 26.1	Medium	Over 1/4 of area with visibility and proximity of project.	Medium	Long term (35 years)/ Reversible	Fair	Physical presence of project 16-miles to 30+ miles; with variable visibility.	Medium	Recreation and ocean focused recreation with multiple user groups and interests.	Moderate
State Nature and Historic Preserves	248.4	N/A	John H. Chafee State Nature Preserve. Open to the public and provides agricultural, educational, and scenic values, as well as natural and historical resources	Low	Preservation of local heritage and resources.	Low	Preservation of heritage resources of the region.	Medium	3.1 / 1.2	Small	Resource is approximately 24-miles from nearest WTG with minimal visibility.	Low	Long term (35 years)/ Reversible	Fair	Physical distance from project and overall visibility.	Low	Localized interests with preservation focus, limited to no visibility of project.	Negligible
State Forests	5,301.6	N/A	Manuel F. Correllus State Forest, located on the inland portion of Martha's Vineyard, Massachusetts, is the only state forest. Inland forest with vegetation and topography.	Low	Located in the center of Martha's Vineyard, multi-use recreation activities.	Low	Large local recreation resource with internally focused activities, surrounded by urban development.	Low	7.8 / .2	Small	Inland recreation resource with limited visibility of project.	Low	Long term (35 years)/ Reversible	Fair	Inland location with intervening influence of vegetation, topography and built environment.	Low	Localized recreation resource, surrounded by urban development with intervening features that limit project visibility.	Negligible
State Beaches	165.1	N/A	Nine state beaches; heavily used bathing beaches that typically include large parking areas, bathhouses, pavilions, and concession buildings.	Medium	Recreation destination for high number of users with focus of activities towards ocean environment.	High	Iconic eastern shore beach destinations with high user interest.	High	78.2/ 47.4	Medium	Approximately 1/2 of beach areas with visibility of project beyond 20-miles.	Medium	Long term (35 years)/ Reversible	Fair	Beach locations are at or beyond 20-miles from project where scale decreases but project is perceivable.	Medium	Popular beach destinations with viewer focus toward ocean and beach activities. Overall distance from project is approximately 20-miles.	Moderate

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
Highways Designated or Eligible as Scenic	411.6	N/A	Two scenic byways are located within Rhode Island with waterfront, shoreline and coastline views.	Medium	Scenic Byway designation indicates value and importance of resources associated.	High	Protection of designation and associated iconic views.	High	43.4 / 10.5	Small	Overall low percentage of visibility in relation to linear resource.	Low	Long term (35 years)/ Reversible	Fair	Low to intermittent visibility and associated intervening features.	Medium	Importance of scenic byway designation and preservation of resource with intermittent and variable viewing conditions from motorists.	Moderate
National Historic Trails	990.1	N/A	Washington-Rochambeau Revolutionary Route - national resource with period significance related to setting.	High	Congressionally designated trail resource with historic significance.	High	Changes in visual setting related to the trail.	High	.8 / .1	Small	Small percentage of visibility related to resource.	Low	Long term (35 years)/ Reversible	Fair	Low visibility with intermix of urban and natural features with WTG distance ranging from 18 to 40-miles.	Low	National Trail designation significance (high sensitivity) with low visibility of project.	Minor
National Recreation Trails	88.6	AI03	Cliff Walk within Ochre Point Cliffs Historic District with iconic setting and views.	High	Views of the Atlantic Ocean historic mansions, wildflowers, wildlife, and shorelines.	Medium	Iconic setting with interests associated with preservation of resource and views.	High	65.1 / 73.4	Large	Large percentage of resource has visibility of project.	High	Long term (35 years)/ Reversible	Fair	Visibility of project in relation to resource within approximately 15-miles.	High	Importance of resources in relation to setting and natural environment with a large portion of the trail having visibility of project.	Major
State Fishing and Boating Access Sites	371.4	N/A	45 state-owned and/or -managed fishing and boating access sites with focus on maritime or ocean related activities.	Low	Recreational focus with inter-related views of ocean and setting.	Low	Primary focus of resources is related to recreation activities in interrelated ocean setting.	Medium	78.4 / 21.1	Medium	Approximately 1/4 of acres with visibility of project and are at least 16-miles from lease area.	Low	Long term (35 years)/ Reversible	Fair	Resources in relation to project and visibility.	Medium	Recreation resource with interrelated interest in ocean setting and views, variable distances from project beyond 16-miles.	Moderate
Lighthouses	23.0	BI04, C01, MM04, MV09, RI01	32 lighthouses; with proximity to ocean edge based on nature of resource and setting.	High	Lighthouses are characteristically associated with shoreline areas and settings with ocean focus.	High	Visitors and users of lighthouse resources as destination and iconic setting.	High	6.6 / 28.7	Medium	One lighthouse within approximately 9-miles of project. All others are associated with ocean	High	Long term (35 years)/ Reversible	Fair	Proximity of lighthouses in relation to project influences potential visibility and prominence.	High	Nature of lighthouses in relation to iconic ocean setting and proximity of project.	Major

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Susceptibility Rationale	Susceptibility Rating (high, medium, low)	Value Rationale	Value Rating (high, medium, low)	SLIA Sensitivity Rating Rationale	SLIA Sensitivity Rating (high, medium, low)	Geographic Extent of Specially Designated Area with Visibility of Alternative (Acres/Percentage) *Proposed Action (Alternative B)*	Geographic Extent Rating (large, medium, small)	Size or Scale Rating Rationale (degree of change from existing conditions)	Size and scale Rating (large, medium, small)	Duration/ Reversibility Rationale	Duration/ Reversibility Rating (good, fair, poor)	SLIA Magnitude Rating Rationale	SLIA Magnitude Rating (large, medium, small)	SLIA Overall Impact Level Rationale	SLIA Overall Impact Level (major, moderate, minor, negligible)
											proximity that orients them closer to project.							
Public Beaches	4,221.0	AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09	178 public beaches with recreation focus and ocean facing views, iconic settings	Medium	Iconic recreation destination for high number of users with focus towards ocean and beach activities.	Medium	Typically higher interests in ocean setting with variable activities and user focus.	Medium	11,38.8 / 27.0	Medium	Approximately 1/4 of acres with visibility of project. Viewer position along beaches is often inline with project.	Medium	Long term (35 years)/ Reversible	Fair	Closest beach is approximately 13-miles; variable viewer perspectives and positioning.	Medium	Iconic beach setting with high user interest and activity though viewer position and visibility of project can be variable.	Moderate
Ferry Routes	10,641.7	N/A	20 different ferry routes originating from multiple locations around project. Proximity of routes to project.	Medium	Dedicated ocean focused uses used for either pleasure or utility purposes.	Medium	Variability in users and interests intermixed with other seagoing vessels.	Medium	6,365.0 / 59.8	Large	Over 1.2 of ferry routes with visibility due to open ocean environment.	High	Long term (35 years)/ Reversible	Fair	Resource is ocean based and in closer proximity to project, though duration of view can be short-term and directional.	High	Variability in viewer interest and overall sensitivity within dedicated ferry lanes. Proximity of project in relation to routes influences prominence based on duration and direction.	Moderate
Seaports	90.1	N/A	Five seaports associated with working waterfront activity	Low	Industrial and seagoing areas with associated infrastructure.	Low	Variable users and interests; with primary focus related to industry.	Low	2.3 / 2.5	Small	Overall low visibility and perception of project due to intermix of other built features and distance.	Low	Long term (35 years)/ Reversible	Fair	Perceivability of project in relation to other seaport uses and activities.	Low	Primary focus of seaports related to industrial and commercial uses with surrounding infrastructure and built environment.	Negligible
Other State Land with Public Access	9,361.8	N/A	Variability of other resources associated with natural resources, recreation activities and locally sensitive uses.	Medium	Variability of uses and interests.	Medium	Variable users and interests	Medium	325.3 / 3.5	Small	Overall small percentage of visibility in relation to total acres.	Low	Long term (35 years)/ Reversible	Fair	Variability of locations, which based on visibility can be assumed to be inland focused.	Low	High variability in use, interest and sensitivity; low overall visibility as compared to total acres.	Negligible

Table G-42. Visual Impact Assessment Impacts Matrix for Alternative C (Habitat Alternative)

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative C1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C1	Distance to Nearest Turbine (miles/nautical miles) Alternative C2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C2	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
CI01	Cuttyhunk Island	High	13.9/12.1	13.9/12.1	17.8/15.5	13.9/12.1	17.8/15.5	C2	The reduction of WTGs in close proximity of the KOP would not decrease visibility of the WTGs. WTG reduction would be localized to the center view of the KOP, where turbines are removed surrounding the eastern most OSS. The lease area would appear to have two separate WTG areas.	Major
MM01	Gooseberry Island	Medium	15.2/13.2	15.2/13.2	22.4/19.5	15.2/13.2	22.3/19.4	C1 and C2	The reduction of WTGs associated with each Alternative would not decrease visibility of the WTGs within 20-miles of the KOP. WTG reduction would be localized to areas beyond 20-miles and would remove turbines that have WTG blades visible along the horizon.	Minor
MV02	Philbin Beach	High	13.6/11.8	13.8/12.0	13.6/11.8	13.8/12.0	13.6/11.8	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Moderate
MV05	Moshup Beach	High	13.8/12.0	13.7/11.9	13.7/11.9	13.7/11.9	13.7/11.9	C1 and C2	Alternative C1 and C2 would have similar impacts. The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Major
MV05	Moshup Beach - Sunset	High	13.8/12.1	13.7/11.9	13.7/11.9	13.7/11.9	13.7/11.9	C1 and C2	Alternative C1 and C2 would have similar impacts. The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing.	Major
MV07	Aquinnah Overlook	High	13.7/12.0	13.7/12.0	14.0/12.1	13.7/12.0	14.0/12.1	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Moderate
MV07	Aquinnah Overlook - Sunset	High	13.7/12.0	13.7/12.0	14.0/12.2	13.7/12.1	14.0/12.2	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing.	Major
MV07	Aquinnah Overlook - Night	High	13.7/12.0	13.7/12.0	14.0/12.3	13.7/12.2	14.0/12.3	C2	Alternative C2 would have slightly fewer nighttime impacts with the reduction of 3 WTGs within the center of view. The reduction of WTGs within the center of the lease area would reduce the density of the project within the viewshed at night, though would not decrease visibility of the WTGs left and right of center of the KOP. The Alternative would visually appear as two separate projects based on visible lighting, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP. WTG lighting would be visible right and left of center of the KOP.	Major
MV09	Gay Head Lighthouse	High	13.9/12.1	13.9/12.1	14.1/12.3	13.9/12.1	14.1/12.3	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Moderate

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative C1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C1	Distance to Nearest Turbine (miles/nautical miles) Alternative C2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative C2	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
MV10	South Beach State Park	High	22.0/19.1	22.0/19.1	25.3/22.0	22.0/19.1	25.3/22.0	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project along the center of the horizon of the viewshed, though would not decrease predominant visibility of the WTGs left of center of the KOP.	Major
MV11	Wasque Point	Low	24.8/21.5	24.8/21.5	28.5/24.8	24.8/21.5	28.5/24.8	C1 and C2	he reduction of WTGs associated with each Alternative within the center of the lease area would reduce the visibility of WTG blades visible along the right of center of KOP along the horizon, though would not decrease visibility of the WTGs center and left of center of the KOP.	Minor
MV12	Peaked Hill Reservation	High	16.3/14.2	16.3/14.2	17.3/15.1	16.3/14.2	17.3/15.1	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Major
MV12	Peaked Hill Reservation - Sunset	High	16.3/14.2	16.3/14.2	17.3/15.1	16.3/14.2	17.3/15.1	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Major
MV13	Edwin DeVries Vanderhoop Homestead	Medium	13.8/12.0	13.8/12.0	14.0/12.1	13.8/12.0	14.0/12.1	C1 and C2	Alternative C1 and C2 would have similar impacts. The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 15-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Moderate
NI10	Madaket Beach	Medium	34.6/30.0	34.6/30.0	39.0/34.0	34.6/30.0	39.7/34.5	C1 and C2	No change from Proposed Action. Views of eastern portion of the lease area from the KOP would be the same as the Proposed Action. A small portion of the turbine blades would be visible on the distance horizon under clear viewing conditions.	Minor
NL01	Nomans Land Island NWR *(not occupied)*	Medium	8.7/7.5	8.7/7.5	9.0/7.8	8.7/7.5	9.0/7.8	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP within 8 to 12-miles. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP.	Moderate
NL01	Nomans Land Island NWR - Sunset *(not occupied)*	Medium	8.7/7.5	8.7/7.5	9.0/7.9	8.7/7.6	9.0/7.9	C1 and C2	The reduction of WTGs associated with each Alternative within the center of the lease area would reduce the density of the project within the viewshed, though would not decrease visibility of the WTGs left and right of center of the KOP. Both alternatives would visually appear as two separate projects, with a slight variation associated with Alternative 1 where 3 WTGs remain in the center of view from the KOP. The backlighting resulting from sunset conditions would enhance the distinctiveness of the break in continuity of the WTG massing.	Major

Table G-43a. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) - Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C1 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Shoreline Beach	SCA	AI06, MV02, MV10, MV11, NI10, RI08, RI09	35.3/ 2.4	35.0/ 2.4	34.7/ 2.3	Alternatives C2 would have negligible reduction in visible acres across all SCAs	SCA - Moderate

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C1 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Coastal Bluff	SCA	BI04, BI12, C01, MV07, MV13, NL01				and LCAs as compared to the Proposed Action. The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the project and associated alternatives.	
Developed Waterfront	SCA	N/A					
Shoreline Residential	SCA	AI03, RI01					
Coastal Dunes	SCA	BI13, MV03, MV05					
Salt Pond/ Tidal Marsh	SCA/LCA	RI06					SCA/ LCA -Moderate
Inland Lakes and Ponds	SCA/LCA	N/A					
Maintained Recreation Area	SCA/LCA	AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01					
Highway Transportation	SCA/LCA	N/A					
Coastal Scrub/ Shrub Forest	LCA	AI05 , AI07, CI01, MM01,					LCA - Minor
Agricultural/ Open Field	LCA	N/A					
Forest	LCA	MV12					
Rural Residential	LCA	N/A					
Suburban Residential	LCA	N/A					
Village/ Town Center	LCA	N/A					
Commercial	LCA	N/A					

Table G-43b. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) - Ocean Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C1 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative C2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Open Ocean	OCA	N/A	5,882.2 / 96.2 Maximum ocean visibility for all alternatives	See Alternative B	See Alternative B	Intact open ocean setting, in immediate proximity of Project (all alternatives) components for duration of Project.	Major

Table G-43c. Seascape Landscape Impact Assessment for Alternative C (Habitat Alternative) - Specially Designated Areas

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B)	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C1	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative C2	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Historic Sites and National Landmarks	12,308.0	AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01	1,222.08 / 9.9	1,218.8 / 9.9	1,218.6/ 9.9	Alternatives C2 would have negligible reduction in visible acres across all Specially Designated Areas as compared to the Proposed Action and overall impacts would remain similar.	Major
National Natural Landmarks	349.7	MV07	255.5 / 73.1	252.3/ 72.2	249.5 / 71.4		Moderate
State Scenic Areas	105,777.6	BI12, CI01, MV07	18,205.6 / 17.2	18,069.1 / 17.1	17,986.7 / 17.0		Major
National Wildlife Refuges	15,176.1	AI05, NL01, RI06	767.7 / 5.1	764.2 / 5.0	762.9 / 5.0		Minor
State/ Non-Profit Wildlife Management Areas	31,967.8	AI07	1,31.4 / .4	131.2 / .4	131.1 / .4		Minor
National Parks	31.2	N/A	.2 / .7	.2 / .7	.2 / .7		Negligible
State Parks	10,473.8	AI01, LI04, MV10, RI08	27,31.7 / 26.1	27,29.6 / 26.1	2,728.6 / 26.1		Moderate
State Nature and Historic Preserves	248.4	N/A	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2		Negligible
State Forests	5,301.6	N/A	7.8 / .2	7.6 / .1	7.7 / .1		Negligible
State Beaches	165.1	N/A	78.2/ 47.4	78.2 / 47.4	78.1 / 47.3		Moderate
Highways Designated or Eligible as Scenic	411.6	N/A	43.4 / 10.5	43.1 / 10.5	43.1 / 10.5		Moderate
National Historic Trails	990.1	N/A	.8 / .1	.8 / .1	.75 / .1		Minor
National Recreation Trails	88.6	AI03	65.1 / 73.4	65.1 / 73.4	65.1 / 73.4		Major
State Fishing and Boating Access Sites	371.4	N/A	78.4 / 21.1	78.2 / 21.1	78.0 / 21.0		Moderate
Lighthouses	23.0	BI04, C01, MM04, MV09, RI01	6.6 / 28.7	6.6 / 28.6	6.6 / 28.6		Major
Public Beaches	4,221.0	AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09	11,38.8 / 27.0	1,137.3 / 27.0	1,135.7 / 26.9		Moderate
Ferry Routes	10,641.7	N/A	6,365.0 / 59.8	6,364.8 / 59.8	6,364.7 / 59.8		Moderate
Seaports	90.1	N/A	2.3 / 2.5	2.0 / 2.2	1.8 / 2.1		Negligible
Other State Land with Public Access	9,361.8	N/A	325.3 / 3.5	324.1 / 3.5	323.1 / 3.5		Negligible
Total Acres for Comparison	**195,700.8**		**30,208.0 / 15.4**	**30,058.6 / 15.4**	**29,967.9 / 15.3**	–	–

Table G-44a. Visual Impact Assessment Impacts Matrix - Alternative D (Transit Alternative) (see Table G-44b for continuation table)

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative D1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D1	Distance to Nearest Turbine (miles/nautical miles) Alternative D2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D2	Distance to Nearest Turbine (miles/nautical miles) Alternative D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D2
AI01	Brenton Point State Park	Medium	16.7/14.5	16.7/14.5	26.9/23.4	N/A	N/A	18.5/16.1	16.7/14.5	N/A
AI01	Brenton Point State Park - Night	Medium	16.7/14.5	16.7/14.5	27.0/23.4	N/A	N/A	18.5/16.1	16.7/14.5	N/A
AI03	Newport Cliff Walk	High	15.3/13.3	15.3/13.3	26.5/23.0	N/A	N/A	17.2/14.9	15.3/13.3	N/A

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative D1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D1	Distance to Nearest Turbine (miles/nautical miles) Alternative D2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D2	Distance to Nearest Turbine (miles/nautical miles) Alternative D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D2
AI05	Sachuest Point National Wildlife Refuge	High	14.8/12.9	14.8/12.9	27.5/23.9	N/A	N/A	17.0/14.7	14.8/12.9	N/A
AI06	Sachuest Beach (Second Beach)	Medium	16.0/13.9	16.0/13.9	28.6/24.9	N/A	N/A	18.2/15.8	16.0/13.9	N/A
AI07	Hanging Rock (Norman Bird Sanctuary)	High	16.2/14.1	16.2/14.1	28.8/25.1	N/A	N/A	18.4/16.0	16.2/14.1	N/A
BI04	Southeast Lighthouse	High	15.3/13.3	15.3/13.3	18.5/16.1	N/A	N/A	15.5/13.4	15.3/13.3	N/A
BI04	Southeast Lighthouse - Night	High	15.3/13.4	15.3/13.3	18.5/16.1	N/A	N/A	15.5/13.4	15.3/13.3	N/A
BI12	Clayhead Trail	High	15.9/13.8	15.9/13.8	20.3/17.6	N/A	N/A	16.7/14.5	15.9/13.8	N/A
BI13	North Light	High	17.2/15.0	17.2/15.0	21.7/18.9	N/A	N/A	18.0/15.7	17.2/15.0	N/A
CI01	Cuttyhunk Island	High	13.9/12.1	13.9/12.1	17.8/15.5	N/A	N/A	13.9/12.1	14.2/12.4	N/A
C01	Beavertail Lighthouse	Medium	18.4/15.9	18.4/15.9	27.6/24.0	N/A	N/A	20.0/17.4	18.4/15.9	N/A
LI04	Montauk Point State Park	Medium	31.5/27.4	31.5/27.4	33.8/29.4	N/A	N/A	31.5/27.3	31.9/27.7	31.5/27.4
LI04	Montauk Point State Park - Night	High	31.5/27.4	31.5/27.4	33.8/29.4	N/A	N/A	31.5/27.4	31.9/27.7	31.5/27.4
MM01	Gooseberry Island	Medium	15.2/13.2	15.2/13.2	22.4/19.5	N/A	N/A	16.6/14.5	15.1/13.2	N/A
MM04	Nobska Lighthouse	Medium	28.2/24.5	28.2/24.5	33.7/29.3	N/A	N/A	N/A	N/A	N/A
MV02	Philbin Beach	High	13.6/11.8	13.6/11.8	18.8/16.4	13.6/11.8	14.2/12.3	N/A	N/A	13.6/11.8
MV03	Lucy Vincent Beach	High	15.5/13.5	15.5/13.5	21.3/18.5	16.9/14.7	15.5/13.5	N/A	N/A	16.9/14.7
MV03	Lucy Vincent Beach - Sunset	Medium	15.5/13.5	15.5/13.5	21.3/18.5	16.9/14.7	15.5/13.5	N/A	N/A	16.9/14.7
MV05	Moshup Beach	High	13.8/12.0	13.7/11.9	19.2/16.5	13.7/11.9	14.5/12.6	N/A	N/A	13.7/11.9
MV05	Moshup Beach - Sunset	High	13.8/12.1	13.7/11.9	19.2/16.5	13.7/11.9	14.5/12.6	N/A	N/A	13.7/11.9
MV07	Aquinnah Overlook	High	13.7/12.0	13.7/12.0	19.3/16.8	13.7/11.9	14.9/12.9	N/A	N/A	13.7/11.9
MV07	Aquinnah Overlook - Sunset	High	13.7/12.0	13.7/12.0	19.3/16.8	13.7/11.9	14.9/12.9	N/A	N/A	13.7/11.9
MV07	Aquinnah Overlook - Night	High	13.7/12.0	13.7/12.0	19.3/16.8	13.7/11.9	14.9/12.9	N/A	N/A	13.7/11.9
MV09	Gay Head Lighthouse	High	13.9/12.1	13.9/12.1	19.4/16.9	13.9/12.1	15.0/13.0	N/A	N/A	13.9/12.1
MV10	South Beach State Park	High	22.0/19.1	22.0/19.1	28.6/24.9	25.3/22.0	22.0/19.1	N/A	N/A	25.3/22.0
MV11	Wasque Point	Low	24.8/21.5	24.8/21.5	31.5/27.4	N/A	N/A	N/A	N/A	N/A
MV12	Peaked Hill Reservation	Medium	16.3/14.2	16.3/14.2	22.0/19.1	17.3/15.1	16.3/14.2	N/A	N/A	17.3/15.1
MV12	Peaked Hill Reservation - Sunset	High	16.3/14.2	16.3/14.2	22.0/19.1	17.3/15.1	16.3/14.2	N/A	N/A	17.3/15.1

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative D1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D1	Distance to Nearest Turbine (miles/nautical miles) Alternative D2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D2	Distance to Nearest Turbine (miles/nautical miles) Alternative D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D2
MV13	Edwin DeVries Vanderhoop Homestead	Medium	13.8/12.0	13.8/12.0	19.3/16.8	13.8/12.0	14.8/12.9	N/A	N/A	13.8/12.0
NL01	Nomans Land Island NWR - Sunset *(not occupied)*	Low	8.7/7.5	8.7/7.5	13.7/11.9	9.0/7.8	8.7/7.5	N/A	N/A	9.0/7.8
NL01	Nomans Land Island NWR *(not occupied)*	Medium	8.7/7.5	8.7/7.5	13.7/11.9	9.0/7.8	8.7/7.5	N/A	N/A	9.0/7.8
NI10	Madaket Beach	Medium	34.6/30.0	34.6/30.0	41.1/35.7	39.0/34.0	34.6/30.0	N/A	N/A	39.0/34.0
RI01	Watch Hill Lighthouse	Medium	32.8/28.5	N/A	N/A	N/A	N/A	33.6/29.3	32.8/28.5	N/A
RI06	Trustom Pond NWR	Medium	22.6/19.6	22.6/19.6	28.3/24.6	N/A	N/A	23.5/20.4	22.6/19.6	N/A
RI08	Scarborough Beach State Park	Medium	19.1/16.6	19.1/16.6	25.6/22.3	N/A	N/A	19.9/17.3	19.1/16.6	N/A
RI09	Narragansett Beach	Medium	20.0/17.4	20.0/17.4	28.0/24.3	N/A	N/A	21.4/18.6	20.0/17.4	N/A

Table G-44b. Visual Impact Assessment Impacts Matrix - Alternative D (Transit Alternative)

KOP Number	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2 & D3	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
AI01	N/A	18.5/16.1	16.7/14.5	18.5/16.1	16.7/14.5	18.5/16.1	16.7/14.5	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible , though appear small in scale.	Moderate
AI01	N/A	18.5/16.1	16.7/14.5	18.5/16.1	16.7/14.5	18.5/16.1	16.7/14.5	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles which removes the first row of visible WTGs along the horizon. When viewed at night, warning lights will be visible along horizon where nighttime lighting does not currently exist.	Moderate
AI03	N/A	17.2/14.9	15.3/13.3	17.2/14.9	15.3/13.3	17.2/14.9	15.3/13.3	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles which reduces the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale.	Moderate
AI05	N/A	17.0/14.7	14.8/12.9	17.0/14.7	14.8/12.9	17.0/14.7	14.8/12.9	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale.	Moderate
AI06	N/A	18.2/15.8	16.0/13.9	18.2/15.8	16.0/13.9	18.2/15.8	16.0/13.9	D1& D2 & D3	Alternative D2 would increase the distance between the KOP and nearest turbine by approximately 2-miles which reduces the overall visibility of the WTGs along the horizon.	Minor
AI07	N/A	18.4/16.0	16.2/14.1	18.4/16.0	16.2/14.1	18.4/16.0	16.2/14.1	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible and prominent.	Moderate
BI04	N/A	15.5/13.4	15.3/13.3	15.5/13.4	15.3/13.3	15.5/13.4	15.3/13.3	D1& D2 & D3	Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. Overall	Moderate

KOP Number	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2 & D3	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
									the combinations of Alternatives D1 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	
BI04	N/A	15.5/13.4	15.3/13.3	15.5/13.4	15.3/13.3	15.5/13.4	15.3/13.3	D1& D2 & D3	Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. Overall the combinations of Alternatives D1 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. When viewed at night, warning lights will continue be visible along horizon similar to the Proposed Action where nighttime lighting does not currently exist.	Major
BI12	N/A	16.7/14.5	15.9/13.8	16.7/14.5	15.9/13.8	16.7/14.5	15.9/13.8	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1-mile removing 1 string of WTGs. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Moderate
BI13	N/A	18.0/15.7	17.2/15.0	18.0/15.7	17.2/15.0	18.0/15.7	17.2/15.0	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1-mile removing 1 string of WTGs. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Moderate
CI01	N/A	13.9/12.1	14.2/12.4	13.9/12.1	14.2/12.4	13.9/12.1	14.2/12.4	D1& D2 & D3	Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only two WTGs would be removed that is nearest the KOP. Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Major
C01	N/A	20.0/17.4	18.4/15.9	20.0/17.4	18.4/15.9	20.0/17.4	18.4/15.9	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 2-miles. The overall massing of the WTGs within the lease area would appear smaller in scale along the horizon as a result of the increased distance and influence of the curvature of the earth.	Minor
LI04	33.8/29.4	31.5/27.4	31.9/27.7	31.5/27.4	31.9/27.7	31.5/27.4	31.9/27.7	D1& D2 & D3	Alternative D1 would not be perceivable along horizon due to distance (over 30 miles) and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting.	Negligible
LI04	33.8/29.4	31.5/27.4	31.9/27.7	31.5/27.4	31.9/27.7	31.5/27.4	31.9/27.7	D1& D2 & D3	The addition of aviation warning lights along the horizon within the viewshed would be perceivable by the focused viewer, but not a dominant element as compared to other existing warning lighting sources associated with BIWF that are in closer proximity (approximately 16 miles).	Negligible
MM01	N/A	16.6/14.5	15.1/13.2	16.6/14.5	15.1/13.2	16.6/14.5	15.1/13.2	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1.5-miles removing two of the WTGs. The overall massing of the WTGs (blades) within the lease area would continue to be perceivable along the horizon.	Minor
MM04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D1& D2 & D3	Alternative D3 would negligibly increase the distance between the KOP and nearest WTGs as only one WTG would be removed that is nearest the KOP. D3 would remove outer strings of WTGs when viewed far right of center. The overall massing of the WTGs (hub and blades) within the lease area would continue to be perceivable along the horizon.	Minor
MV02	14.2/12.3	N/A	N/A	13.6/11.8	14.2/12.3	13.6/11.8	14.2/12.3	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Moderate
MV03	15.5/13.5	N/A	N/A	16.9/14.7	15.5/13.5	16.9/14.7	15.5/13.5	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the lease area would be partially obscured (towers) with hubs and blades still visible above the landform, but not a major focus of attention by beach users.	Minor

KOP Number	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2 & D3	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
MV03	15.5/13.5	N/A	N/A	16.9/14.7	15.5/13.5	16.9/14.7	15.5/13.5	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the lease area would be partially obscured (towers) with hubs and blades still visible above the landform, which, when backlit would continue to draw the viewers eye due to movement.	Moderate
MV05	14.5/12.6	N/A	N/A	13.7/11.9	14.5/12.6	13.7/11.9	14.5/12.6	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Major
MV05	14.5/12.6	N/A	N/A	13.7/11.9	14.5/12.6	13.7/11.9	14.5/12.6	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the lease area, when backlit would continue to draw the viewers eye due to movement.	Moderate
MV07	14.9/12.9	N/A	N/A	13.7/11.9	14.9/12.9	13.7/11.9	14.9/12.9	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP.	Major
MV07	14.9/12.9	N/A	N/A	13.7/11.9	14.9/12.9	13.7/11.9	14.9/12.9	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the lease area, when backlit would continue to draw the viewers eye due to movement and dark contrast.	Major
MV07	14.9/12.9	N/A	N/A	13.7/11.9	14.9/12.9	13.7/11.9	14.9/12.9	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP. WTG hazard lighting would be visible along the horizon based on turbine distance, with platform and tower lighting more prevalent with the first four strings of WTGs.	Moderate
MV09	15.0/13.0	N/A	N/A	13.9/12.1	15.0/13.0	13.9/12.1	15.0/13.0	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP.	Major
MV10	22.0/19.1	N/A	N/A	25.3/22.0	22.0/19.1	25.3/22.0	22.0/19.1	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the lease area would be partially obscured (towers) with hubs and blades still visible continue to draw the viewers eye due to movement.	Moderate
MV11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the left of Nomans Land Island which are unobstructed and prominent along the horizon. The remaining WTGs visible within the lease area would be partially obscured (towers) with hubs and blades perceivable along the horizon based on lighting conditions.	Minor
MV12	16.3/14.2	N/A	N/A	17.3/15.1	16.3/14.2	17.3/15.1	16.3/14.2	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Major
MV12	16.3/14.2	N/A	N/A	17.3/15.1	16.3/14.2	17.3/15.1	16.3/14.2	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs and geometric form of the OSSs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the lease area, when backlit would continue to draw the viewers eye due to movement and dark contrast.	Major

KOP Number	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D2	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D2 & D3	Distance to Nearest Turbine (miles/nautical miles) Alternatives D1, D2 & D3	Distance to Nearest Turbine Removed (miles/nautical miles) Alternatives D1, D2 & D3	Alternative with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
MV13	14.8/12.9	N/A	N/A	13.8/12.0	14.8/12.9	13.8/12.0	14.8/12.9	D1& D2 & D3	Alternative D2 would remove the majority of WTGs visible (8 WTGs) to the right of Nomans Land Island which are unobstructed and prominent along the horizon. A portion of the lease area would continue to be visible left of the OSS with the remaining predominantly obscured to the right of center of the KOP (right of the OSS) by intervening topography.	Major
NL01	8.7/7.5	N/A	N/A	9.0/7.8	8.7/7.5	9.0/7.8	8.7/7.5	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon.	Major
NL01	8.7/7.5	N/A	N/A	9.0/7.8	8.7/7.5	9.0/7.8	8.7/7.5	D1& D2 & D3	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1-mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP.	Major
NI10	34.6/30.0	N/A	N/A	39.0/34.0	34.6/30.0	39.0/34.0	34.6/30.0	D1& D2 & D3	Overall the combinations of Alternatives D2 and D3 would remove outer strings of WTGs when viewed far left of center and far right of center. The overall massing of the WTGs within the lease area would continue to be visually prominent along the horizon and be the center of focus from the KOP. The remaining WTGs visible within the lease area, when backlit would continue to draw the viewers eye due to movement and dark contrast.	Negligible
RI01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1-mile which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row would not be visible.	Negligible
RI06	N/A	23.5/20.4	22.6/19.6	23.5/20.4	22.6/19.6	23.5/20.4	22.6/19.6	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1-miles which reduces the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale.	Minor
RI08	N/A	19.9/17.3	19.1/16.6	19.9/17.3	19.1/16.6	19.9/17.3	19.1/16.6	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 0.5-mile which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale.	Moderate
RI09	N/A	21.4/18.6	20.0/17.4	21.4/18.6	20.0/17.4	21.4/18.6	20.0/17.4	D1& D2 & D3	Alternative D3 would increase the distance between the KOP and nearest WTGs by approximately 1.5-miles which removes the first row of visible WTGs along the horizon. WTGs beyond the first removed row are still visible, though appear small in scale.	Moderate

Table G-45a. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) - Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Shoreline Beach	SCA	AI06, MV02, MV10, MV11,	35.3/ 2.4	35.3/2.4	32.0/2.2	34.7/2.3	31.8/2.1	34.6/2.3	34.6/2.3	31.1/2.1	Alternative D1& D2 & D3 would have minor reduction in visible	SCA - Moderate

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 & D3 Total SCA/LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
		NI10, RI08, RI09								acres across all SCAs and LCAs (approximately 4.2 square miles) as compared to the Proposed Action. The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the project and associated alternatives.	
Coastal Bluff	SCA	BI04, BI12, C01, MV07, MV13, NL01									
Developed Waterfront	SCA	N/A									
Shoreline Residential	SCA	AI03, RI01									
Coastal Dunes	SCA	BI13, MV03, MV05									
Salt Pond/ Tidal Marsh	SCA/LCA	RI06									SCA/LCA - Moderate
Inland Lakes and Ponds	SCA/LCA	N/A									
Maintained Recreation Area	SCA/LCA	AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01									
Highway Transportation	SCA/LCA	N/A									
Coastal Scrub/ Shrub Forest	LCA	AI05 , AI07, CI01, MM01,									LCA - Minor
Agricultural/ Open Field	LCA	N/A									
Forest	LCA	MV12									
Rural Residential	LCA	N/A									
Suburban Residential	LCA	N/A									
Village/ Town Center	LCA	N/A									
Commercial	LCA	N/A									

Table G-45b. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) - Ocean Character Areas

Character Area Name	Character Area Association (SCA/LCA/ OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D3 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D3 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D2 & D3 Total OCA area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative D1 & D2 & D3 Total OCA area within Analysis Area: 6,113.4 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Open Ocean	OCA	N/A	5,882.2 / 96.2 Maximum ocean visibility as compared to all alternatives	See Alternative B	See Alternative B	See Alternative B	See Alternative B	See Alternative B	See Alternative B	See Alternative B	Intact open ocean setting, in immediate proximity of Project components for duration of Project.	Major

Table G-45c. Seascape Landscape Impact Assessment for Alternative D (Transit Alternative) - Specially Designated Areas

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B)	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 & D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2 & D3	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Historic Sites and National Landmarks	12,308.0	AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01	1,222.1 / 9.9	1,211.2 / 9.8	1,188.8 / 9.7	1,183.7 / 9.6	1,177.5 / 9.6	1172.3 / 9.5	1,150 / 9.3	1,139 / 9.2	Alternative D1& D2 & D3 would have a minor reduction in visible acres across all Specially Designated Areas as compared to the Proposed Action, though overall impacts would remain similar. The combination of Alternatives reduces a greater area of visibility resulting from the reduction of turbines along the eastern and northwestern portions of the lease area.	Major
National Natural Landmarks	349.7	MV07	255.5 / 73.1	255.5 / 73.1	248.9 / 71.2	254.6 / 72.8	247.6 / 70.8	254.6 / 72.8	248.0 / 70.9	246.7 / 70.5		Moderate
State Scenic Areas	105,777.6	BI12, CI01, MV07	18,205.6 / 17.2	18,179.6 / 17.2	17,365.0 / 16.4	17,944.7 / 17.0	17,303.0 / 16.4	17,912.6 / 16.9	17,092.3 / 16.2	17,029.4 / 16.1		Major
National Wildlife Refuges	15,176.1	AI05, NL01, RI06	767.7 / 5.1	767.3 / 5.1	738.7 / 4.9	754.3 / 5.0	736.7 / 4.9	753.7 / 5.0	725.11 / 4.8	723.1 / 4.8		Minor
State/ Non-Profit Wildlife Management Areas	31,967.8	AI07	1,31.4 / .4	130.9 /.4	125.5 / .4	120.6 / .4	123.7 / .4	120.1 / .4	114.7 / .4	112.9 / .4		Minor
National Parks	31.2	N/A	0.2 / 0.7	0.2 /.7	0.0 / 0	0.2 / .7	0.0 / 0	0.2 / .7	0.0 / 0	0.0 / 0		Negligible
State Parks	10,473.8	AI01, LI04, MV10, RI08	2,731.7 / 26.1	2,730.4 / 62.1	2,704.0 / 25.8	2,724.1 / 26.0	2,702.0 / 25.8	2,722.5 / 26.0	2,695.7 / 25.7	2,693.6 / 25.7		Moderate
State Nature and Historic Preserves	248.4	N/A	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2	3.1 / 1.2		Negligible
State Forests	5,301.6	N/A	7.8 / .2	7.8 / .2	2.2 / .04	7.8 / .1	2.1 / .04	7.8 / .1	2.2 / .04	2.1 / .04		Negligible
State Beaches	165.1	N/A	78.2/ 47.4	78.2 / 47.4	78.2 / 47.3	76.4 / 46.2	78.1 / 47.3	76.4 / 46.2	76.3 / 46.2	76.3 / 46.2		Moderate
Highways Designated or Eligible as Scenic	411.6	N/A	43.4 / 10.5	43.3 / 10.5	43.0 / 10.4	41.9 / 10.2	42.8 / 10.4	41.7 / 10.1	41.4 / 10.1	41.2 / 10.1		Moderate
National Historic Trails	990.1	N/A	0.8 / 0.1	0.7 / .1	0.7 / .1	0.6 / .1	0.7 / .1	0.6 / .1	0.6 /.1	0.6 / .1		Minor
National Recreation Trails	88.6	AI03	65.1 / 73.4	65.1 / 73.4	64.2 / 72.4	65.1 / 73.4	64.2 / 72.4	65.1 / 73.4	64.2 / 72.4	64.2 / 72.4		Major

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B)	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D2 & D3	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative D1 & D2 & D3	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
State Fishing and Boating Access Sites	371.4	N/A	78.4 / 21.1	78.0 / 21.0	78.2 / 21.1	77.1 / 20.7	77.7 / 20.9	76.7 / 20.6	76.9 / 20.7	76.4 / 20.6		Moderate
Lighthouses	23.0	BI04, C01, MM04, MV09, RI01	6.6 / 28.7	6.6 / 28.7	6.2 / 27.0	6.6 / 28.5	6.2 / 27.0	6.6 / 28.5	6.2 / 27.0	6.2 / 27.0		Major
Public Beaches	4,221.0	AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09	11,38.8 / 27.0	1,137.1 / 27.0	1,099.5 / 26.1	1,126.0 / 26.7	1,097.5 / 26.0	1,124.2 / 26.6	1,086.5 / 25.7	1,084.4 / 25.7		Moderate
Ferry Routes	10,641.7	N/A	6,365.0 / 59.8	6,365.0 / 59.8	6,364.9 / 59.8	6,364.5 / 59.8	6,364.8 / 59.8	6,364.4 / 59.8	6,364.5 / 59.8	6,364.4 / 59.8		Moderate
Seaports	90.1	N/A	2.3 / 2.5	2.3 / 2.5	1.8 / 2.0	2.3 / 2.5	1.8 / 2.0	2.3 / 2.5	1.8 / 2.0	1.8 / 2.0		Negligible
Other State Land with Public Access	9,361.8	N/A	325.3 / 3.5	322.3 / 3.4	325.3 / 3.5	315.9 / 3.4	322.3 / 3.4	312.8 / 3.3	315.9 / 3.4	312.8 / 3.3		Negligible
Total Acres for Comparison	**195,700.8**		**30,208.0 / 15.4**	**30,174.3 / 15.4**	**29,250.8 / 14.9**	**29,886.8 / 15.3**	**29,175.7 / 14.9**	**29,846.3 / 15.3**	**30,066.5 / 15.4**	**28,840.4 / 14.7**	–	–

Table G-46. Visual Impact Assessment Impacts Matrix - Alternative E (Viewshed Alternative)

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative E1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1	Distance to Nearest Turbine (miles/nautical miles) Alternative E2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2	Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
AI01	Brenton Point State Park	Medium	16.7/14.5	18.6/16.2	16.7/14.5	20.7/18.0	16.7/14.5	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
AI01	Brenton Point State Park - Night	Medium	16.7/14.5	18.6/16.3	16.7/14.6	20.7/18.1	16.7/14.5	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles. When viewed at night, single aviation warning lights on nacelle may be visible intermittently along horizon where nighttime lighting does not currently exist.	Moderate
AI03	Newport Cliff Walk	High	15.3/13.3	17.8/15.5	15.3/13.3	19.4/16.9	15.3/13.3	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
AI05	Sachuest Point National Wildlife Refuge	High	14.8/12.9	18.4/16.0	14.8/12.9	18.9/16.4	14.8/12.9	E1 and E2	Alternatives E1 and E2 would increase the distance between the KOP and nearest turbine by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
AI06	Sachuest Beach (Second Beach)	Medium	16.0/13.9	19.5/17.0	16.0/13.9	20.1/17.4	16.0/13.9	E2	Alternative E2 would increase the distance between the KOP and nearest turbine by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
AI07	Hanging Rock (Norman Bird Sanctuary)	High	16.2/14.1	19.8/17.2	16.2/14.1	20.3/17.7	16.2/14.1	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
BI04	Southeast Lighthouse	High	15.3/13.3	15.3/13.3	19.9/17.3	15.5/13.4	15.3/13.3	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Moderate

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative E1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1	Distance to Nearest Turbine (miles/nautical miles) Alternative E2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2	Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
BI04	Southeast Lighthouse - Night	High	15.3/13.4	15.3/13.3	19.9/17.3	15.5/13.4	15.3/13.3	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Moderate
BI12	Clayhead Trail	High	15.9/13.8	15.9/13.8	19.9/17.3	16.7/14.5	15.9/13.8	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Minor
BI13	North Light	High	17.2/15.0	17.2/15.0	21.0/18.2	18.0/15.7	17.2/15.0	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Minor
CI01	Cuttyhunk Island	High	13.9/12.1	19.2/16.7	13.9/12.1	14.9/12.9	13.9/12.1	E1	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Moderate
MM01	Gooseberry Island	Medium	15.2/13.2	20.7/18.0	15.1/13.2	17.8/15.5	15.1/13.2	E1	Alternative E2 would increase the distance between the KOP and nearest turbine by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
MM04	Nobska Lighthouse	Medium	28.2/24.5	28.2/24.5	28.3/24.6	28.2/24.5	28.3/24.6	E1	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 4-miles which reduces the overall visibility of the WTGs along the horizon.	Negligible
MV02	Philbin Beach	High	13.6/11.8	14.2/12.3	13.6/11.8	13.6/11.8	13.8/12.0	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately .5-miles though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible left of center of the KOP beyond Nomans Land Island.	Moderate
MV03	Lucy Vincent Beach	High	15.5/13.6	15.5/13.4	16.9/14.7	15.5/13.5	18.7/16.3	E1	Alternative E1 would increase the distance between the KOP and turbines far right of center of the KOP along the horizon of the landform removing visibility, where WTGs are visible as part of the Proposed Action. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action.	Moderate
MV03	Lucy Vincent Beach - Sunset	Medium	15.5/13.7	15.5/13.5	16.9/14.8	15.5/13.5	18.7/16.3	E1	Alternative E1 would increase the distance between the KOP and turbines far right of center of the KOP along the horizon of the landform removing visibility, where WTGs are visible as part of the Proposed Action. WTGs would continue to be visible left of center of the KOP, similar to the Proposed Action.	Major
MV05	Moshup Beach	High	13.8/12.0	14.5/12.6	13.7/11.9	13.7/11.9	13.7/11.9	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1-mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP.	Moderate
MV05	Moshup Beach - Sunset	High	13.8/12.1	14.5/12.7	13.7/11.9	13.7/11.9	13.7/11.9	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1 -mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP where backlighting creates contrast.	Moderate
MV07	Aquinnah Overlook	High	13.7/12.0	14.9/12.9	13.7/11.9	14.0/12.2	13.7/11.9	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1-mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon, particularly with atmospheric conditions. WTGs would continue to be visible center and left of center of the KOP.	Moderate
MV07	Aquinnah Overlook - Sunset	High	13.7/12.0	14.9/12.9	13.7/11.9	14.0/12.2	13.7/11.9	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 1-mile though a greater reduction of WTGs when viewed from center to right of center of the KOP would be reduced along the horizon. WTGs would continue to be visible center and left of center of the KOP.	Moderate
MV07	Aquinnah Overlook - Night	High	13.7/12.0	14.9/12.9	13.7/11.9	14.0/12.2	13.7/11.9	E1	Alternative E1 would increase the distance between the KOP and nearest WTG (lighting) by approximately 1-mile though a greater reduction of WTG lighting	Moderate

KOP Number	KOP Name	SLVIA Sensitivity Rating (high, medium, low)	Distance to Nearest Turbine (miles/nautical miles) Proposed Action	Distance to Nearest Turbine miles/nautical miles) Alternative E1	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E1	Distance to Nearest Turbine (miles/nautical miles) Alternative E2	Distance to Nearest Turbine Removed (miles/nautical miles) Alternative E2	Alternative(s) with greatest reduced visual impact to KOP as compared to the Proposed Action	VIA Overall Impact Level Rationale	VIA Overall Impact Level (major, moderate, minor, negligible)
									when viewed from center to right of center of the KOP would be reduced along the horizon. WTG lighting would continue to be visible center and left of center of the KOP.	
MV09	Gay Head Lighthouse	High	13.9/12.1	15.0/13.0	13.9/12.1	14.1/12.3	13.9/12.1	E1	Alternative E1 would increase the distance between the KOP and nearest WTGs by approximately 2-miles. Though a greater reduction of WTGs when viewed from left of center of the KOP would be reduced to the far horizon (approximately 16-20-miles). WTGs would continue to be visible right of center KOP to include the OSS.	Moderate
MV10	South Beach State Park	High	22.0/19.1	22.0/19.1	25.3/22.0	22.0/19.1	28.6/24.9	E1 and E2	WTGs along eastern portion of lease area would remain for both Alternatives as compared to the Proposed Action with no visible change.	Moderate
MV11	Wasque Point	Low	24.8/21.5	24.8/21.5	28.5/24.8	24.8/21.5	32.1/28.0	E1 and E2	WTGs along eastern portion of lease area would remain for both Alternatives as compared to the Proposed Action with no visible change.	Minor
MV12	Peaked Hill Reservation	Medium	16.3/14.2	16.3/14.2	17.3/15.1	16.314.2	18.7/16.2	E1	Alternative E1 would increase the distance (approximately 10-miles) between the KOP and turbines at the far right of center of the KOP along the horizon. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action.	Moderate
MV12	Peaked Hill Reservation - Sunset	High	16.3/14.2	16.3/14.3	17.3/15.1	16.314.2	18.7/16.2	E1	Alternative E1 would increase the distance (approximately 10-miles) between the KOP and turbines at the far right of center of the KOP along the horizon. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action where backlighting creates contrast.	Major
MV13	Edwin DeVries Vanderhoop Homestead	Medium	13.8/12.0	14.8/12.9	13.8/12.0	14.0/12.1	13.8/12.0	E1	Alternative E1 would increase the distance (approximately 20-miles) between the KOP and turbines at the far right of center of the KOP, though topography blocks right of KOP views. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action.	Major
NI10	Madaket Beach	Medium	34.6/30.0	34.6/30.0	39.7/34.5	34.6/30.0	45.0/39.0	E1 and E2	Alternatives E1 and E2 would have similar views of WTGs along the far horizon, with turbine blade tips visible within a narrow view, during clear viewing conditions. Due to distance, WTGs would be predominately obscured.	Minor
NL01	Nomans Land Island NWR *(not occupied)*	Low	8.7/7.5	8.7/7.5	9.0/7.8	8.7/7.5	12.1/10.5	E1	Alternative E1 would increase the distance (approximately 16 to 19-miles) between the KOP and turbines at the far right of center of the KOP. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action.	Moderate
NL01	Nomans Land Island NWR - Sunset *(not occupied)*	Medium	8.7/7.5	8.7/7.6	9.0/7.8	8.7/7.5	12.1/10.5	E1	Alternative E1 would increase the distance (approximately 16 to 19-miles) between the KOP and turbines at the far right of center of the KOP. WTGs would continue to be visible center and left of center of the KOP, similar to the Proposed Action.	Major
RI06	Trustom Pond NWR	Medium	22.6/19.6	22.6/19.6	23.8/20.7	23.5/20.4	22.6/19.6	E2	The reduction of WTGs would remove visibility of the WTGs along the horizon within the lease area. an occasional blade tip may be perceivable but not an influencing factor in overall impact.	Negligible
RI08	Scarborough Beach State Park	Medium	19.1/16.6	19.1/16.6	19.3/16.7	20.2/17.5	19.1/16.6	E2	E2 would have slightly less impacts as compared to E1. The reduction of WTGs in close proximity of the KOP would not decrease visibility of the WTGs along the horizon. WTG reduction would be localized to the far left of center of the KOP, with the majority of the WTGs remaining within the center of view.	Moderate
RI09	Narragansett Beach	Medium	20.0/17.4	20.7/18.0	20.0/17.4	22.3/19.4	20.0/17.4	E2	Alternative E2 would increase the distance between the KOP and nearest WTGs by approximately 2-miles. WTG reduction would be localized to the center of the KOP, with the majority of the WTGs remaining to the right of center of the KOP.	Moderate

Table G-47a. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) - Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E1 Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E2 Total SCA and LCA area within Analysis Area: 1,488.1 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Shoreline Beach	SCA	AI06, MV02, MV10, MV11, NI10, RI08, RI09	35.3 / 2.4	32.7 / 2.2	33.5 / 2.3	Alternatives E1 would have negligible reduction in visible acres across all SCAs and LCAs (approximately 2.6 square miles) as compared to the Proposed Action. The importance of SCAs for recreation and other uses along with residential areas of LCAs in close proximity of SCAs where ocean views dominate or are of high value, influence the overall impact level associated with the project and associated alternatives.	SCA - Moderate
Coastal Bluff	SCA	BI04, BI12, C01, MV07, MV13, NL01					
Developed Waterfront	SCA	N/A					
Shoreline Residential	SCA	AI03, RI01					
Coastal Dunes	SCA	BI13, MV03, MV05					
Salt Pond/ Tidal Marsh	SCA/LCA	RI06					SCA/LCA - Moderate
Inland Lakes and Ponds	SCA/LCA	N/A					
Maintained Recreation Area	SCA/LCA	AI01, AI03, BI04, C01, LI04, MM04, MV09, RI01					
Highway Transportation	SCA/LCA	N/A					
Coastal Scrub/ Shrub Forest	LCA	AI05, AI07, CI01, MM01,					LCA - Minor
Agricultural/ Open Field	LCA	N/A					
Forest	LCA	MV12					
Rural Residential	LCA	N/A					
Suburban Residential	LCA	N/A					
Village/ Town Center	LCA	N/A					
Commercial	LCA	N/A					

Table G-47b. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) - Ocean Character Areas

Character Area Name	Character Area Association (SCA/LCA/OCA)	Key Observation Points with Simulations	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative B - Proposed Action Total Ocean area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E1 Total Ocean area within Analysis Area: 6,113.4 Square Miles	Geographic Extent of Analysis Area with Visibility of Alternative (square miles/percentage) Alternative E2 Total Ocean area within Analysis Area: 6,113.4 Square Miles	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Open Ocean	OCA	N/A	5,882.2 / 96.2 Maximum ocean visibility as compared to all alternatives	See Alternative B	See Alternative B	Intact open ocean setting, in immediate proximity of Project components for duration of Project.	Major

Table G-47c. Seascape Landscape Impact Assessment for Alternative E (Viewshed Alternative) - Specially Designated Areas

Specially Designated Areas	Specially Designated Area Total Acres	Key Observation Points with Simulations	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Proposed Action (Alternative B)	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E1	Geographic Extent of Specially Designated Area with Visibility of Alternative (acres/percentage) Alternative E2	SLIA Overall Impact Level Rationale for the Alternative with the reduced level of impacts as compared to the Proposed Action	SLIA Overall Impact Level (major, moderate, minor, negligible)
Historic Sites and National Landmarks	12,308.0	AI01, AI03, BI04, BI12, BI13, C01, C02, BI13, MM04, MV07, MV09, MV13, RI01	1,222.8 / 9.9	1,103.3 / 9.0	1,121.7 / 9.1	Alternatives E1 would have negligible reduction in visible acres across all Specially Designated Areas as compared to the Proposed Action and overall impacts would remain similar.	Major
National Natural Landmarks	349.7	MV07	255.5 / 73.1	252.1 / 72.2	252.7 / 72.3		Moderate
State Scenic Areas	105,777.6	BI12, CI01, MV07	18,205.6 / 17.2	17,359.2/ 16.4	17,528.0 / 16.5		Major
National Wildlife Refuges	15,176.1	AI05, NL01, RI06	767.7 / 5.1	737.6 / 4.9	734.3 / 4.8		Minor
State/ Non-Profit Wildlife Management Areas	31,967.8	AI07	131.4 / .4	123.7 / .4	114.1 / .4		Minor
National Parks	31.2	N/A	.2 / .7	0.2 / .7	0.2 / .7		Negligible
State Parks	10,473.8	AI01, LI04, MV10, RI08	27,31.7 / 26.1	2,638 / 25.2	2,699.8 / 25.8		Moderate
State Nature and Historic Preserves	248.4	N/A	3.1 / 1.2	2.6 / 1.0	2.4 / 1.0		Negligible
State Forests	5,301.6	N/A	7.8 / .2	7.7 / .1	7.7 / .1		Negligible
State Beaches	165.1	N/A	78.2/ 47.4	75.1 / 45.5	74.3 / 45.0		Moderate
Highways Designated or Eligible as Scenic	411.6	N/A	43.4 / 10.5	39.7 / 9.7	39.3 / 9.6		Moderate
National Historic Trails	990.1	N/A	.8 / .1	.7 /.1	.5 / .04		Minor
National Recreation Trails	88.6	AI03	65.1 / 73.4	64.8 / 73.2	64.9 / 73.2		Major
State Fishing and Boating Access Sites	371.4	N/A	78.4 / 21.1	74.5 / 20.1	74.8 / 20.2		Medium
Lighthouses	23.0	BI04, C01, MM04, MV09, RI01	6.6 / 28.7	6.5 / 28.3	6.5 / 28.3		Major
Public Beaches	4,221.0	AI06, MM01, MV02, MV03, MV05, MV11, NI10, RI09	11,38.8 / 27.0	1,053 / 25.0	1,109.2 / 26.3		Moderate
Ferry Routes	10,641.7	N/A	6,365.0 / 59.8	6363.8 / 59.8	6,363.0 / 59.8		Moderate
Seaports	90.1	N/A	2.3 / 2.5	2.2 / 2.5	2.3 / 2.5		Negligible
Other State Land with Public Access	9,361.8	N/A	325.3 / 3.5	282.1 / 3.0	309.2 / 3.3		Negligible
Total Acres For Comparison	**195,700.8**		**30,208.0 / 15.4**	**29,084.8 / 14.9**	**29,384.5 / 15.0**	–	–

Table G-48. Visual Impact Assessment Impacts Matrix for Cumulative Impacts

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Cumulative Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Lease Area within Viewshed in Addition to Proposed Action	Geographic Extent Rating (large, medium, small)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
BI04	Southeast Lighthouse	SCA	East	161.1	Yes	VTL2	15.3/13.3	180	Highly visible and likely to attract the attention of lighthouse visitors based on lighting conditions, although not as prominent as the existing BIWF.	Medium	OCS-A 0517 OCS-A 0487	Medium	Visibility based on lighting conditions, existing BIWF visibility, duration	**Medium**	Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions	**Moderate**
BI04	Southeast Lighthouse - Night	SCA	East	161.1	Yes	VTL 4	15.3/13.4	180	The addition of the flashing warning lights on the WTGs and decks will add evidence of human development and increase visual clutter at the horizon.	Large	OCS-A 0517 OCS-A 0487	Large	Visibility based on lighting conditions, existing BIWF visibility, duration	**Large**	Importance of recreation and historic resources, duration and visibility from KOP based on lighting conditions	**Major**
BI12	Clayhead Trail	SCA	East	78.8	No	VTL1	15.9/13.8	180	Visible and likely to attract attention resulting from angle of view of WTGs	Medium	OCS-A 0517 OCS-A 0487	Medium	Visibility of WTGs within viewshed along horizon line within viewshed	**Medium**	Importance of preservation of scenic district and uses; proximity and visibility of Project	**Moderate**
BI13	North Light	SCA	East	27.5	No	VTL4	17.2/15.0	160	Turbines become the focus of views out to the water and the tight spacing and numerous turbines along the horizon draw the viewers' eye away from natural features.	Large	OCS-A 0517 OCS-A 0487	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of recreation and historic resources; proximity of residential viewers, duration and visibility from KOP	**Moderate**
LI04	Montauk Point State Park	SCA/LCA	East	48.0	Yes	VTL1	31.5/27.4	180	Due to distance and viewer position in relation to other features in the landscape, the right field of view would have some visibility of WTG blades associated with OCS-A 0487.	Small	OCS-A 0517 OCS-A 0487	Large	Projects would become perceivable along horizon, though will be variable due to distance and atmospheric influences	**Medium**	Project would not be perceivable along horizon due to distance and atmospheric influences. Occasional blade tips and movement may be noticeable by the focused viewer or backlighting.	**Minor**
LI04	Montauk Point State Park - Night	SCA/LCA	East	48.0	Yes	VTL2	31.5/27.4	180	Due to distance and viewer position in relation to other features in the landscape, there would be a negligible change.	Small	OCS-A 0517 OCS-A 0487	Small	Additional projects would not be perceivable along horizon if observer views were focused toward lighting. Light house illumination is most prominent.	**Small**	Additional lighting is negligible on horizon right of KOP viewshed. Lighthouse illumination is the focus.	**Negligible**
MV02	Philbin Beach	SCA	South-Southwest to West-Southwest	10.5	No	VTL5	13.6/11.8	180	Turbines are very visible on the horizon line and will dominate the view from the KOP.	Large	OCS-A 0487 OCS-A 0500	Large	Additional WTGs visible to left of KOP at approximately same distance as eastern portion of Proposed Action.	**Large**	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines within viewshed	**Moderate**
MV03	Lucy Vincent Beach	SCA	South-Southwest to Southwest	27.7	No	VTL 3	15.5/13.5	180	More direct views of additional lease areas. Visible and likely to attract the attention resulting from angle of view of WTGs.	Medium	OCS-A 0487 OCS-A 0500	Medium	Visibility of WTGs within viewshed along horizon line within viewshed, through further visibility is beyond horizon	**Medium**	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	**Moderate**

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Cumulative Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Lease Area within Viewshed in Addition to Proposed Action	Geographic Extent Rating (large, medium, small)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
MV03	Lucy Vincent Beach - Sunset	SCA	South-Southwest to Southwest	27.7	No	VTL 4	15.5/13.6	180	WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the proposed Project.	Large	OCS-A 0487 OCS-A 0500	Medium	Visibility of backlit WTGs within viewshed along horizon line within viewshed	**Large**	Scenic values; prominence of turbines- sunset backlighting of turbines along with movement influences prominence	**Major**
MV05	Moshup Beach	SCA	South-Southwest to West-Southwest	23.1	No	VTL 5	13.7/11.9	180	With the proposed RWF in place, the nacelles and rotors from numerous WTGs and two OSSs will be visible from this KOP in the background along the horizon.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of natural landscape and natural recreation opportunities, scenic values; prominence of turbines	**Moderate**
MV05	Moshup Beach - Sunset	SCA	South-Southwest to West-Southwest	23.1	No	VTL 5	13.7/11.10	180	WTGs appear dark gray against the light sky and the position of the sun serves as a focal point, drawing the viewer's eye toward part of the proposed Project.	Large	OCS-A 0487 OCS-A 0500	Large	Visibility of backlit WTGs within viewshed along horizon line within viewshed	**Large**	Scenic values; prominence of backlit turbines on the horizon	**Major**
MV07	Aquinnah Overlook	SCA	South to Southwest	145.5	Yes	VTL 3	13.7/11.9	180	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Prominent, dedicated viewpoint	**Major**
MV07	Aquinnah Overlook - Sunset	SCA	South to Southwest	145.5	Yes	VTL 5	13.7/11.10	180	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Prominent, dedicated viewpoint	**Major**
MV07	Aquinnah Overlook - Night	SCA	South to Southwest	145.5	Yes	VTL 3	13.7/11.11	180	OSSs become focal points along the wide horizon and the overlook is no longer just for views of the ocean but includes the turbines on the ocean.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Prominent, dedicated viewpoint; warning lighting appears low on the horizon	**Major**
MV09	Gay Head Lighthouse	SCA	South to West-Southwest	162.1	No	VTL 4	13.9/12.1	180	The two OSSs appear as dark elements on the horizon suspended above the water surface. From this superior vantage point, the entirety of the Project is visible.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of historic lighthouse, scenic values; prominence of turbines and OSSs	**Major**
MV10	South Beach State Park	SCA	Southwest to West-Southwest	17.0	No	VTL3	15.0/13.0	180	Nacelles and rotors from numerous WTGs will be visible in the background along the horizon. Turbines are visible on the horizon and provide a focal point.	Large	OCS-A 0487 OCS-A 0500 OCS-A 501	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon within full viewshed.	**Major**

KOP Number	KOP Name	Representative Character Area (SCA, LCA, OCA)	Viewing Direction	Elevation (feet)	Cumulative Simulation	Visibility Threshold	Distance to Nearest Turbine (miles/nautical miles)	Horizontal Field of View Occupied	Size or Scale Rationale	Size and Scale Rating (large, medium, small)	Lease Area within Viewshed in Addition to Proposed Action	Geographic Extent Rating (large, medium, small)	SLVIA Magnitude Rating Rationale	SLVIA Magnitude Rating (large, medium, small)	SLVIA Overall Impact Level Rationale	SLVIA Overall Impact Level (major, moderate, minor, negligible)
MV11	Wasque Point	SCA	West-Southwest	13.6	Yes	VTL 2	15.0/13.0	180	Nearest WTG is approximately 15 miles away; the towers are largely obscured due to curvature of the Earth, with their degree of exposure decreasing from left to right.	Large	OCS-A 0487 OCS-A 0500 OCS-A 501	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of natural landscape and natural recreation opportunities; massing of turbines on horizon within full viewshed.	**Major**
MV12	Peaked Hill Reservation	LCA	South-Southwest to Southwest	305.1	No	VTL 1	16.3/14.2	180	KOP on Peaked Hill represents a discrete view to the southwest that requires the viewer to be perfectly positioned.	Small	OCS-A 0487 OCS-A 0500	Small Based on simulation graphic all are visible / vegetation and perspective influence	Size and scale in relation to existing conditions, vegetation and viewer perspective	**Small**	Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to intervening vegetation and landforms	**Major**
MV12	Peaked Hill Reservation - Sunset	LCA	South-Southwest to Southwest	305.1	No	VTL4	16.3/14.2	180	Sunset illumination and backlighting influences change	Large	OCS-A 0487 OCS-A 0500	Large Based on simulation graphic all are visible / vegetation and perspective influence	Backlighting of WTGs, increased visibility	**Large**	Importance of cultural significance and natural recreation opportunities; visibility of WTGs due to backlighting	**Major**
MV13	Edwin DeVries Vanderhoop Homestead	SCA	South to Southwest	17.0	No	VTL5	13.8/12.0	180	WTGs are visible; light gray towers, nacelles, and rotors are fully visible above the horizon.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Importance of natural landscape and natural recreation opportunities; visibility of WTGs due to distance and percentage of visibility	**Major**
NI10	Madaket Beach	SCA	West	20.6	Yes	VTL1	17.0/ 14.8	180	WTGs are barely visible along the horizon, with a small cluster of turbine blades and nacelle comprising the majority of visible features.	Small	OCS-A 0500 OCS-A 501 OCS-A 520 OCS-A 521 OCS-A 522	Small although numerous Lease Areas are within viewshed	Variable lighting and atmospheric conditions influence visibility	**Small**	Numerous lease areas are within viewshed, though perceivability of WTGs from KOP is highly influenced on visibility conditions.	**Major**
NL01	Nomans Land Island NWR *(not occupied)*	SCA	West-Southwest	42.1	Yes	VTL5	8.7/7.5	180	WTGs appear as gray vertical lines against the yellow backdrop of the sky that look out of character with the vast extent of open water.	Large	OCS-A 0487 OCS-A 0500	Large	Size and scale in relation to existing conditions along with percentage of visibility	**Large**	Intact seascape and prominence of WTGs in close proximity, although no viewers	**Major**
NL01	Nomans Land Island NWR - Sunset *(not occupied)*	SCA	West-Southwest	42.1	Yes	VTL6	8.7/7.6	180	Sunset illumination and backlighting influences change	Large	OCS-A 0487 OCS-A 0500	Large	Backlighting of WTGs, increased visibility	**Large**	Intact seascape and prominence of WTGs, although no viewers; backlighting of WTGs and OSS	**Major**

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APPENDIX H

List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

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List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent H-1

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List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

Table H-1. Federal Agencies

Cooperating Federal Agencies	Contact	Location
Bureau of Safety and Environmental Enforcement	Cheri Hunter (571) 474-6969 cheri.hunter@bsee.gov	Sterling, Virginia
National Oceanic and Atmospheric Administration	Sue Tuxbury (978) 281-9176 susan.tuxbury@noaa.gov	Gloucester, Massachusetts
U.S. Army Corps of Engineers	Christine Jacek (978) 318-8026 (978) 578-7548 christine.m.jacek@usace.army.mil	New England District
U.S. Coast Guard	George Detweiler (202) 372-1566 George.H.Detweiler@uscg.mil	Washington, D.C.
U.S. Environmental Protection Agency	Timothy Timmermann (617) 918-1025 Timmermann.Timothy@epa.gov	Boston, Massachusetts
Participating Federal Agencies	**Contact**	**Location**
Advisory Council on Historic Preservation	Chris Daniel (202) 517-0223 cdaniel@achp.gov	Washington, D.C.
Federal Aviation Administration	Cindy Whitten (816) 329-2528 Cindy.whitten@faa.gov	Washington, D.C.
National Park Service	Mary Krueger (978) 342-2719 Mary_C_Krueger@nps.gov	Fitchburg, Massachusetts
U.S. Department of Defense	Terry Bowers (703) 693-9447 (571) 232-2482 terry.l.bowers14.civ@mail.mil	New Alexandria, Virginia
U.S. Department of the Navy	Matthew Senska (703) 614-2201 Matthew.senska@navy.mil	Washington, D.C.
U.S. Fish and Wildlife Service	Jane Ledwin (703) 358-2585 Jane_Ledwin@fws.gov	Falls Church, Virginia

Table H-2. State and Local Agencies or Other Interested Parties

Agency	Contact	Location
Commonwealth of Massachusetts; Massachusetts Office of Coastal Zone Management	Lisa Engler (617) 626-1230 lisa.engler@state.ma.us	Boston, Massachusetts
Rhode Island Coastal Resources Management Council	Jeffrey Willis (401) 783-3370 jwillis@crmc.ri.gov	Wakefield, Rhode Island
State of Rhode Island; Rhode Island Department of Environmental Management	Terry Gray (401) 222-2771 terry.gray@dem.ri.gov	Providence, Rhode Island
Connecticut State Historic Preservation Office, Connecticut Department of Economic and Community Development	Mary Dunne (860) 500-2356 mary.dunne@ct.gov	Hartford, Connecticut
Rhode Island Historical Preservation & Heritage Commission	Jeffery Emidy (401) 222-4134 jeffrey.emidy@preservation.ri.gov	Providence, Rhode Island
New York State Division for Historic Preservation	Tim Lloyd (518) 268-2186 timothy.lloyd@parks.ny.gov	Waterford, New York
Massachusetts Historical Commission	Brona Simon (617) 727-2816 brona.simon@sec.state.ma.us	Boston, Massachusetts

Table H-3. Tribes and Native Organizations

Tribes and Native Organizations	State
Delaware Nation	Delaware
Delaware Tribe of Indians	Delaware
Mashantucket Pequot Tribal Nation	Connecticut
Mashpee Wampanoag Tribe	Massachusetts
Mohegan Tribe of Indians of Connecticut	Connecticut
Narragansett Indian Tribe	Rhode Island
Shinnecock Indian Tribe	New York
Wampanoag Tribe of Gay Head (Aquinnah)	Massachusetts

APPENDIX I

Other Impacts

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Unavoidable Adverse Impacts of the Proposed Action

Table I-1 summarizes unavoidable adverse impacts for each resource analyzed in the Revolution Wind Farm and Revolution Wind Export Cable Project (the Project) environmental impact statement (EIS). These impacts are subject to applicable environmental protection measures (EPMs) (see Table F-1 in Appendix F). Table I-1 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Please see the individual resource discussions in Chapter 3 for detailed analyses.

Table I-1. Potential Unavoidable Adverse Impacts of the Action Alternatives by Resource

Resource Area	Potential Unavoidable Adverse Impacts of the Action Alternatives
Air quality	• Impacts from emissions from engines associated with vessel traffic, construction activities, equipment operation, and decommissioning activities
Bats	• Displacement and avoidance behavior due to habitat loss and alteration, equipment noise, and vessel traffic • Individual mortality due to collisions with operating wind turbine generator (WTGs)
Benthic habitat and invertebrates	• Increase in suspended sediments and resulting effects due to seafloor disturbance • Habitat quality impacts, including reduction in habitat as a result of seafloor surface alterations • Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and electromagnetic fields (EMFs) • Individual mortality due to construction and installation, operations and maintenance (O&M), and decommissioning • Conversion of soft-bottom habitat to new hard-bottom habitat
Birds	• Displacement and avoidance behavior due to habitat loss and alteration, lighting, equipment noise, and vessel traffic • Individual mortality due to collisions with operating WTGs
Coastal habitats and fauna	• Displacement and avoidance behavior from habitat loss and alteration and equipment noise • Individual mortality from collisions with vehicles or construction equipment • Short-term habitat alteration and increased invasive species risk
Commercial fisheries and for-hire recreational fishing	• Disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore Project elements • Disruption to harvesting activities during operations of offshore wind facility • Changes in vessel transit and fishing patterns • Changes in risk of gear entanglement or target species
Cultural resources	• Impacts to unidentified or undefined submerged marine resources from Project construction and installation, O&M, and decommissioning Impacts to terrestrial cultural resources and the viewshed from Project construction and installation and O&M • Visual impacts to onshore cultural resources

Resource Area	Potential Unavoidable Adverse Impacts of the Action Alternatives
Demographics, employment, and economics	• Disruption of commercial fishing, for-hire recreational fishing, and marine recreational businesses during offshore construction and cable installation • Hindrances to ocean economy sectors due to the presence of the offshore wind facility, including commercial fishing, recreational fishing, sailing, sightseeing, and supporting businesses
Environmental justice	• Changes to air quality, water quality, land use and coastal infrastructure, and commercial fisheries and for-hire recreational fishing that are disproportionately borne by minority or low-income populations from Project construction and installation, O&M, and decommissioning
Finfish and essential fish habitat	• Increase in suspended sediments and resulting effects due to seafloor disturbance • Habitat quality impacts, including a reduction in habitat as a result of seafloor surface alterations • Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMFs • Individual mortality due to construction and installation, O&M, and decommissioning • Conversion of soft-bottom habitat to new hard-bottom habitat (for some species)
Land use and coastal infrastructure	• Land use disturbance due to construction as well as effects due to noise, vibration, and travel delays
Marine mammals	• Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, and sediment deposition during construction and installation and O&M • Temporary loss of current ambient acoustic habitat and increased potential for vessel strikes
Navigation and vessel traffic	• Changes in vessel transit patterns • Increased navigational complexity and allision risk within the offshore wind farm area
Other uses	• Changes in access to marine mineral resource, and cable placement • Disruption of scientific surveys, radar systems, military, and aviation traffic
Recreation and tourism	• Disruption of coastal recreation activities during onshore construction, such as beach access • Viewshed effects from the WTGs altering enjoyment of marine and coastal recreation and tourism activities • Disruption to access or temporary restriction of in-water recreational activities from construction of offshore Project elements • Hindrances to some types of recreational fishing from the WTGs during operation
Sea turtles	• Disturbance, displacement, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and EMFs
Visual resources	• Change in scenic quality of landscape and seascape
Water quality	• Increase in erosion, turbidity and sediment resuspension, and inadvertent spills during construction and installation, O&M, and decommissioning
Wetlands and other waters of the U.S.	• Increase in soil erosion, sedimentation, and discharges and releases from land disturbance during construction and installation, O&M, and decommissioning

Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the short-term loss of timber productivity in forested areas that are kept clear for a power line or a road. Table I-2 summarizes irreversible or irretrievable impacts for each resource analyzed in the EIS, subject to applicable EPMs. Table I-2 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Chapter 3 provides a detailed discussion of effects associated with the Project.

Table I-2. Irreversible and Irretrievable Commitment of Resources by Resource Area for the Proposed Action

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Air quality	No	No	The Bureau of Ocean Energy Management (BOEM) expects air emissions to be in compliance with permits regulating air quality standards, and emissions would be temporary during construction activities. If the Proposed Action displaces fossil fuel energy generation, overall improvement of air quality would be expected.
Bats	No	No	Irreversible impacts on bats could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with the U.S. Fish and Wildlife Service (USFWS) would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bat displacement from foraging habitat.
Benthic habitat and invertebrates	No	No	Although local mortality could occur, BOEM does not anticipate population-level impacts. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning.
Birds	No	No	Irreversible impacts on birds could occur if one or more individuals were injured or killed; however, implementation of mitigation measures developed in consultation with the USFWS would reduce or eliminate the potential for such impacts. Decommissioning of the Project would reverse the impacts of bird displacement from foraging habitat.
Coastal habitats and fauna	No	No	Although local mortality could occur, BOEM does not anticipate population-level impacts on other coastal habitats or fauna. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Commercial fisheries and for-hire recreational fishing	No	Yes	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on commercial fisheries to be irreversible. The Project could alter habitat during construction and operations, limit access to fishing areas during construction, or reduce vessel maneuverability during operations. However, decommissioning of the Project would reverse those impacts. Irretrievable impacts (lost revenue) could occur due to the loss of use of fishing areas at an individual level.
Cultural resources	Yes	Yes	Although unlikely, unanticipated removal or disturbance of previously unidentified cultural resources onshore and offshore could result in irreversible or irretrievable impacts.
Demographics, employment, and economics	No	No	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate that contractor needs, housing needs, and supply requirements would lead to an irretrievable loss of workers for other projects or increase housing and supply costs.
Environmental justice	No	No	Potential environmental justice impacts, if any, would be short term and localized.
Finfish and essential fish habitat	No	No	Although local mortality could occur, BOEM does not anticipate population-level impacts. The Project could alter habitat during construction and operations but could restore the habitat after decommissioning.
Land use and coastal infrastructure	Yes	Yes	Land use required for construction and operations activities, such as the land proposed for the interconnection facility, could result in a minor irreversible impact. Construction activities could result in a minor irretrievable impact due to the temporary loss of use of the land for otherwise typical activities. Onshore facilities may or may not be decommissioned.
Marine mammals	No	Yes	Irreversible impacts on marine mammals could occur if one or more individuals of species listed under the Endangered Species Act (ESA) were injured or killed; however, NMFS consultation mitigation measures would reduce or eliminate the potential for such impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area.
Navigation and vessel traffic	No	Yes	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on vessel traffic to result in irreversible impacts. Irretrievable impacts could occur due to changes in transit routes, which could be less efficient during the life of the Project.
Other uses	No	Yes	BOEM does not anticipate the potential impacts to be irreversible; however, disruption of offshore scientific research and surveys would occur during proposed Project construction, operations, and decommissioning activities.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Recreation and tourism	No	No	Construction activities near the shore could result in a minor temporary loss of use of the land for recreation and tourism purposes, but these impacts would not be irreversible or irretrievable.
Sea turtles	No	Yes	Irreversible impacts on sea turtles could occur if one or more individuals of species listed under the ESA were injured or killed; however, NMFS consultation mitigation measures would reduce or eliminate the potential for impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area.
Visual resources	No	Yes	Viewshed changes would persist for the life of the Project, until decommissioning is complete.
Water quality	No	No	BOEM does not expect activities to cause loss of or major impacts on existing inland waterbodies or wetlands. Turbidity and other water quality impacts in the marine and coastal environment would be short term, with the rare exception of a major spill.
Wetlands and other Waters of the U.S.	No	No	BOEM does not expect activities to cause loss of or major impacts on existing wetlands or other Waters of the U.S.

Relationship between the Short-Term Use of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

The Council on Environmental Quality's National Environmental Policy Act implementing regulations (40 CFR 1502.16) require that an EIS address the relationship between short-term use of the environment and the potential impacts of such use on the maintenance and enhancement of long-term productivity. Such impacts could occur as a result of a reduction in the flexibility to pursue other options in the future, or assignment of a specific area (land or marine) or resource to a certain use that would not allow other uses, particularly beneficial uses, to occur at a later date. An important consideration when analyzing such effects is whether the short-term environmental effects of the action would result in detrimental effects to long-term productivity of the affected areas or resources.

As assessed in EIS Chapter 3, BOEM anticipates that most of the potential adverse effects associated with the Proposed Action would occur during construction activities and would be temporary and minor or moderate. Table I-1 and Table I-2 identify unavoidable, irretrievable, or irreversible impacts that would be associated with the Project. However, the Bureau of Ocean Energy Management (BOEM) expects most of the marine and onshore environments to return to normal long-term productivity levels after Project decommissioning. Based on these findings, BOEM also anticipates that the Proposed Action would not result in impacts that would significantly narrow the range of future uses of the environment.

Additionally, the Project would provide the following long-term benefits:

- Promotion of clean and safe development of domestic energy sources and clean energy job creation
- Promotion of renewable energy to help ensure geopolitical security; combat climate change; and provide electricity that is affordable, reliable, safe, secure, and clean
- Delivery of power to the New England region to contribute to Connecticut's and Rhode Island's renewable energy goals
- Increased habitat for certain fish species

APPENDIX J

Finding of Adverse Effect for Historic Properties and Draft Memorandum of Agreement

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

Introduction

Attached to this appendix are the Bureau of Ocean Energy Management's (BOEM's) *Finding of Adverse Effect for the Revolution Wind Farm and Revolution Wind Export Cable Construction and Operations Plan* (Finding) and *Draft Memorandum of Agreement Among the Bureau of Ocean Energy Management, the State Historic Preservation Officers of Connecticut, Massachusetts, New York, and Rhode Island, and the Advisory Council on Historic Preservation Regarding the Revolution Wind Farm and Revolution Wind Export Cable Project* (MOA).

The Finding documents BOEM's determination of adverse effect on historic properties pursuant to this environmental impacts statement (EIS) analysis and to Sections 106 and 110 of the National Historic Preservation Act (NHPA), as guided by the Section 106 regulations in 36 Code of Federal Regulations 800. BOEM has found that the Revolution Wind Farm and Revolution Wind Export Cable Project (Project) would have an adverse effect on historic properties.

The MOA would be finalized and its requirements set by BOEM under NHPA Section 106 as a condition of BOEM's signing the record of decision. Mitigation measures for cultural resources are drafted in the MOA and its historic property treatment plans attached in this appendix. Under the MOA, adverse effects from the Project to National Register of Historic Places (NRHP)–eligible cultural resources, including National Historic Landmarks (NHLs) and traditional cultural properties (TCPs), would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f).

The MOA also has attached post-review discovery plans for onshore and offshore cultural resources, should previously undiscovered or unimpacted historic properties be identified and moderate to major negative effects cannot be avoided. The post-review discovery plans would be implemented to assess and resolve any negative effects to these cultural resources. NRHP-eligible cultural resources that are discovered post-review, if adversely affected, would be mitigated through the NHPA Section 106 process.

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Finding of Adverse Effect for the Revolution Wind Farm and Revolution Wind Export Cable Construction and Operations Plan

August 2022

U.S. Department of the Interior
Bureau of Ocean Energy Management
Sterling, Virginia

BOEM
Bureau of Ocean Energy Management

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List of Abbreviations

ACHP	Advisory Council on Historic Preservation
ADLS	aircraft detection lighting system
APE	area of potential effects
ASLF	ancient submerged landform
BOEM	Bureau of Ocean Energy Management
B.P.	before present
bsb	below seabed
ca.	circa
CATEX	Categorical Exclusion
CHRVEA	Cumulative Historic Resources Visual Effects Analysis
confidential	contains material that meets the criteria for confidentiality under Section 304 of the NHPA
CT	Connecticut
EA	Environmental Assessment
EIS	environmental impact statement
Finding	Finding of Effect
FONSI	Finding of No Significant Impact
GIS	geographic information system
HDD	horizontal directional drilling
HRVEA	Historic Resources Visual Effects Analysis
IAC	inter-array cable
ICF	interconnection facility
MA	Massachusetts
MARA	Marine Archaeological Resources Assessment
MHC	Massachusetts Historical Commission
MOA	memorandum of agreement
MW	megawatt
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOI	notice of intent
NPS	National Park Service
NRHP	National Register of Historic Places
NY	New York
O&M	operations and maintenance
OCS	Outer Continental Shelf
OnSS	onshore substation
OSS	offshore substation
PA	programmatic agreement
PAL	Public Archaeology Laboratory, Inc.

PDE	project design envelope
PPAs	power purchase agreements
RI	Rhode Island
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
RI/MA WEA	Rhode Island/Massachusetts Wind Energy Area
ROD	Record of Decision
RODA	Responsible Offshore Development Alliance
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
SAP	Site Assessment Plan
SHPO	State Historic Preservation Officer
SWCA	SWCA Environmental Consultants
TARA	Terrestrial Archaeological Resources Assessment
TCP	Traditional Cultural Property
TNEC	The Narragansett Electric Company
Tribal Nation	Federally-recognized Indian Tribe
vhb	Vanasse Hangen Brustlin, Inc.
VIA	Visual Impact Assessment
WTG	wind turbine generator

1 Introduction

The Bureau of Ocean Energy Management (BOEM) is reviewing the construction and operations plan (COP) prepared by Vanasse Hangen Brustlin, Inc. (vhb) (2021) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (the Project). The RWF is located in the Rhode Island-Massachusetts Wind Energy Area (RI/MA WEA) and the RWEC connects to Rhode Island (RI).

BOEM has made a Finding of Adverse Effect (Finding) for the Project pursuant to Section 106 of the National Historic Preservation Act (NHPA) (54 USC 306108), the implementing regulations for the Section 106 process ("Protection of Historic Properties" 36 CFR Part 800). BOEM has determined the Project will adversely affect National Historic Landmarks (NHLs) and, in compliance with Section 110(f) of the NHPA (54 USC 306107)BOEM, to the maximum extent possible conducted early planning and actions as may be necessary to minimize harm to the NHLs. This Finding documents potential effects to historic properties in marine, terrestrial, and above ground historical contexts including the NHLs. As defined in 36 CFR 800.16(l)(1), "Historic property means any prehistoric [or pre-contact] or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places [NRHP] maintained by the Secretary of the Interior." The term historic property includes all NHLs as well as properties of traditional religious and cultural importance to Tribal Nations that are eligible for NRHP listing (36 CFR 800.16(l)(1)). Historic properties include "properties formally determined as such in accordance with regulations [in 36 CFR 63] of the Secretary of the Interior and all other properties that meet the National Register criteria" (36 CFR 800.16(l)(2)).

1.1 Marine Cultural Resources

In the COP, Revolution Wind, LLC (Revolution Wind) has identified 29 marine cultural resources in the Project's area of potential effects (APE) that are of archaeological interest. Based on potential connections to significant historical events and on the important information these resources could provide, BOEM is treating these 29 resources as eligible for listing in the NRHP and, therefore, as historic properties. These marine cultural resources consist of 19 potential submerged archaeological marine resources, designated as shipwrecks/possible historic shipwrecks; although, they may also include other sunken crafts and structures. The 29 resources further consist of 10 geomorphic features, also referred to as ancient submerged landforms (ASLFs), that are of importance to Tribal Nations as well as being of potential archaeological significance. The COP indicates that all 19 shipwrecks/possible historic shipwrecks would be avoided with sufficient buffers by all proposed activities that are part of the Project and, as a result, there would be no effects to these potential historic properties (SEARCH, Inc. [SEARCH] 2022). Nine of the 10 ASLFs on the Outer Continental Shelf (OCS) and in RI state waters (Table 1) are not fully avoidable by physical disturbance from Project construction activities and, as a result, BOEM has determined these nine would be adversely affected.

Table 1. Historic Properties, Consisting of Ancient Submerged Landforms (Geomorphic Features), Adversely Affected by the Project

Geomorphic Feature ID	Location	Description
Target-21	RWEC (RI)	[redacted]
Target-22	RWEC (RI)	[redacted]

Geomorphic Feature ID	Location	Description
Target-23	RWEC (OCS)	[redacted]
Target-24	RWF (OCS)	
Target-25	RWF (OCS)	
Target-26	RWF (OCS)	
Target-28	RWF (OCS)	
Target-29	RWEC (RI)	
Target-30	RWEC (RI)	

Source: SEARCH (2022:Table 4-2). Mapped ASLF extents and locations (SEARCH 2022) contain material that meets the criteria for confidentiality under Section 304 of the NHPA and are not publicly distributed.

1.2 Terrestrial Cultural Resources

In the COP, Revolution Wind identified four archaeological sites not fully avoidable in the construction of onshore Project components. BOEM has determined that two of the archaeological sites (Table 2) are historic properties and would be adversely affected by onshore substation (OnSS) development.

Table 2. Historic Properties, Consisting of Terrestrial Cultural Resources, Adversely Affected by the Project

Terrestrial Cultural Resources		Portion of Project	Description	
[redacted]	#1	[redacted]	[redacted]	Archaeological
	#2			Archaeological

Source: Forrest and Waller (2021)

1.3 Above Ground Historic Properties

In the COP, the offshore Historic Resources Visual Effects Analysis (HRVEA) (EDR 2022a; 2022b) identified 451 above ground historic properties in the APE. The onshore HRVEA (EDR 2021a) identified 80 above ground historic properties and found two of these to be in the APE. Quonset Pont Historic Naval Air station was addressed in both HRVEAs (EDR 2021a, 2022a). The above ground historic properties range from individual structures to complex sites, historic districts, and Traditional Cultural Properties (TCPs) that are within the viewshed of offshore and onshore Project facilities. BOEM has determined that offshore Project facilities would adversely affect 101 historic properties in RI and Massachusetts (MA) (Table 3) by introducing visual impacts from the Project wind turbine generators (WTGs) and offshore substations (OSSs).

Table 3. Above Ground Historic Properties Adversely Affected by the Project, in Order of Nearest Distance to Project WTGs

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
TCP-3	[redacted] TCP	[redacted]	[redacted]	MA	NRHP-eligible (BOEM determined)	6*
300	Sakonnet Light Station	Little Compton	Newport	RI	NRHP-listed resource	12.7

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
297	Warren Point Historic District	Little Compton	Newport	RI	NRHP-eligible resource (RIHPHC determined)	12.9
299	Abbott Phillips House	Little Compton	Newport	RI	RIHPHC historic resource	13
504	Flaghole	Chilmark	Dukes	MA	MHC historic inventory site	13.3
296	Stone House Inn	Little Compton	Newport	RI	NRHP-listed resource	13.4
503	Simon Mayhew House	Chilmark	Dukes	MA	MHC historic inventory site	13.5
474	Flanders, Ernest House, Shop, Barn	Aquinnah	Dukes	MA	MHC historic inventory site	13.8
496	71 Moshup Trail	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
484	Vanderhoop, Edwin DeVries Homestead	Aquinnah	Dukes	MA	NRHP-listed resource	13.7
480	Gay Head - Aquinnah Shops Area	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
495	3 Windy Hill Drive	Aquinnah	Dukes	MA	MHC historic inventory site	13.9
479	Gay Head Light	Aquinnah	Dukes	MA	NRHP-listed resource	13.9
485	Tom Cooper House	Aquinnah	Dukes	MA	MHC historic inventory site	14
497	Leonard Vanderhoop House	Aquinnah	Dukes	MA	MHC historic inventory site	14
490	Theodore Haskins House	Aquinnah	Dukes	MA	MHC historic inventory site	14.1
486	Gay Head - Aquinnah Coast Guard Station Barracks	Aquinnah	Dukes	MA	MHC historic inventory site	14.1
491	Gay Head - Aquinnah Town Center Historic District	Aquinnah	Dukes	MA	NRHP-listed resource	14.2
303	Gooseneck Causeway	Westport	Bristol	MA	MHC historic inventory site	14.8
304	Gooseberry Neck Observation Towers	Westport	Bristol	MA	MHC historic inventory site	14.8
540	Spring Street	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	14.9
590	Capt. Mark L. Potter House	New Shoreham	Washington	RI	RIHPHC historic resource	14.9
276	Tunipus Goosewing Farm	Little Compton	Newport	RI	NRHP-Eligible Resource (RIHPHC Determined)	15
543	WWII Lookout Tower – Spring Street	New Shoreham	Washington	RI	NRHP-Eligible Resource (RIHPHC Determined)	15.1
251	Westport Harbor	Westport	Bristol	MA	MHC historic inventory site	15.2
290	Bellevue Avenue Historic District NHL	Newport	Newport	RI	NHL	15.2
548	Block Island Southeast Light	New Shoreham	Washington	RI	NHL	15.2
595	New Shoreham Historic District	New Shoreham	Washington	RI	Local Historic	15.3
536	Spring Cottage	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
531	Old Harbor Historic District	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC-determined)	15.3
538	Captain Welcome Dodge Sr.	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
541	Caleb W. Dodge Jr. House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
535	Spring House Hotel	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
545	Pilot Hill Road and Seaweed Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4
222	Ocean Drive Historic District NHL	Newport	Newport	RI	NHL	15.7
298	Marble House NHL	Newport	Newport	RI	NHL	15.7
597	Ochre Point – Cliffs Historic District	Newport	Newport	RI	NRHP-listed resource	15.8
546	WWII Lookout Tower at Sands Pond	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.8
552	Sea View Villa	Middletown	Newport	RI	RIHPHC historic resource	15.9
295	Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House	Newport	Newport	RI	NRHP-listed resource	15.9
293	The Breakers NHL	Newport	Newport	RI	NHL	15.9
516	Corn Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.9
302	Clam Shack Restaurant	Westport	Bristol	MA	MHC historic inventory site	15.9
301	Horseneck Point Lifesaving Station	Westport	Bristol	MA	MHC historic inventory site	15.9
553	Whetstone	Middletown	Newport	RI	RIHPHC historic resource	16
284	The Bluff/John Bancroft Estate	Middletown	Newport	RI	RIHPHC historic resource	16
288	Clambake Club of Newport	Middletown	Newport	RI	NRHP-listed resource	16
530	Old Town and Center Roads	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16
526	Beach Avenue	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
519	Mitchell Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
523	Indian Head Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.2
168	Westport Pt. Revolutionary War Properties	Westport	Bristol	MA	MHC historic inventory site	16.2
261	Indian Avenue Historic District	Middletown	Newport	RI	NRHP-listed resource	16.2
278	St. Georges School	Middletown	Newport	RI	NRHP-listed resource	16.3
528	Hygeia House	New Shoreham	Washington	RI	NRHP-listed resource	16.3
527	U.S. Weather Bureau Station	New Shoreham	Washington	RI	NRHP-listed resource	16.3
549	Miss Abby E. Vaill/1 of 2 Vaill cottages	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
550	Hon. Julius Deming Perkins / ”Bayberry Lodge”	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
542	Lakeside Drive and Mitchell Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.5
280	Land Trust Cottages	Middletown	Newport	RI	NRHP-eligible resource (RIHPHC determined)	16.6
482	Russell Hancock House	Chilmark	Dukes	MA	MHC historic inventory site	16.6
163	Westport Point Historic District (1 of 2)	Westport	Bristol	MA	NRHP-eligible resource (MHC determined)	16.7

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
164	Westport Point Historic District (2 of 2)	Westport	Bristol	MA	NRHP-listed resource	16.7
551	Mohegan Cottage/Everett D. Barlow House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.7
266	Paradise Rocks Historic District	Middletown	Newport	RI	RIHPHC historic resource	16.8
547	Lewis- Dickens Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.8
525	Island Cemetery/Old Burial Ground	New Shoreham	Washington	RI	RI Historical Cemetery	16.8
279	Kay St.-Catherine St.-Old Beach Rd. Historic District/The Hill	Newport	Newport	RI	NRHP-listed resource	16.9
532	Beacon Hill Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.9
533	Nathan Mott Park	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.9
515	Block Island North Lighthouse	New Shoreham	Washington	RI	NRHP-listed resource	17.1
522	Champlin Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.1
517	Hippocampus/Boy's Camp/ Beane Family	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.2
520	U.S. Lifesaving Station	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
518	U.S. Coast Guard Brick House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
521	Peleg Champlin House	New Shoreham	Washington	RI	NRHP-listed resource	17.5
469	Hancock, Captain Samuel - Mitchell, Captain West House	Chilmark	Dukes	MA	NRHP-eligible resource (MHC determined)	17.6
508	Scrubby Neck Schoolhouse	West Tisbury	Dukes	MA	MHC historic inventory site	18
345	Point Judith Lighthouse	Narragansett	Washington	RI	NRHP-listed resource	18.2
245	Bailey Farm	Middletown	Newport	RI	NRHP-listed resource	18.3
226	Beavertail Light	Jamestown	Newport	RI	NRHP-listed resource	18.4
582	Horsehead/Marbella	Jamestown	Newport	RI	NRHP-listed resource	18.6
333	Ocean Road Historic District	Narragansett	Washington	RI	NRHP-listed resource	18.9
335	Dunmere	Narragansett	Washington	RI	NRHP-listed resource	19.1
86	Puncatest Neck Historic District	Tiverton	Newport	RI	RIHPHC historic resource	19.4
576	Fort Varnum/Camp Varnum	Narragansett	Washington	RI	NRHP-eligible resource (RIHPHC determined)	19.6
156	Salters Point	Dartmouth	Bristol	MA	MHC historic inventory site	19.7
578	Dunes Club	Narragansett	Washington	RI	NRHP-listed resource	19.8
329	Life Saving Station at Narragansett Pier	Narragansett	Washington	RI	NRHP-listed resource	19.8
330	The Towers Historic District	Narragansett	Washington	RI	NRHP-listed resource	19.8
591	Narragansett Pier MRA	Narragansett	Washington	RI	NRHP-listed resource	19.8
328	The Towers/Tower Entrance of Narragansett Casino	Narragansett	Washington	RI	NRHP-listed resource	19.9

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
TCP-1	[redacted]	[redacted]	[redacted]	MA	NRHP-eligible resource (BOEM determined)	20
343	Brownings Beach Historic District	South Kingstown	Washington	RI	NRHP-listed resource	21.8
444	Tarpaulin Cove Light	Gosnold	Dukes	MA	NRHP-listed resource	22.2
391	Clark's Point Light	New Bedford	Bristol	MA	NRHP-listed resource	24.6
390	Fort Rodman Historic District	New Bedford	Bristol	MA	NRHP-eligible resource (MHC determined)	24.6
392	Fort Taber Historic District	New Bedford	Bristol	MA	NRHP-listed resource	24.6
386	Butler Flats Light Station	New Bedford	Bristol	MA	NRHP-listed resource	25.6
389	744 Sconticut Neck Road	Fairhaven	Bristol	MA	MHC historic inventory site	25.9
449	Nobska Point Lighthouse	Falmouth	Barnstable	MA	NRHP-listed resource	28

Source: EDR (2022a:Attachment A)

Notes: MHC = Massachusetts Historical Commission, RIHPC = Rhode Island Historical Preservation & Heritage Commission.

* This TCP extends for several miles offshore, including within 6 miles of the nearest potential Project WTG offshore [redacted].

2 Project Overview

On March 13, 2020, BOEM received the initial COP to develop a wind energy project within BOEM Renewable Energy Lease Area OCS-A 0486 (Lease Area) from Revolution Wind. In the revised version of the COP (submitted in December 2021), Revolution Wind proposes the construction, operations, and eventual decommissioning of the Project, with up to 100 WTGs, up to two OSSs, inter-array cables (IACs) buried under the seafloor linking the individual WTGs to the OSS, one OSS-link cable under the seafloor linking the OSSs to each other, up to two offshore sub-seafloor export cables, a 3.1-acre landfall work area for the export cables to come ashore at Quonset Point, a buried onshore transmission cable system, up to one OnSS and adjacent interconnection facility (ICF) with a buried connection line, and an overhead connection from the ICF to The Narragansett Electric Company's (TNEC) existing Davisville Substation (and the electrical grid in RI) (Figures A-1 and A-2 in Appendix A [vhb 2021:Figures ES-1 and ES-2]). Revolution Wind is utilizing a project design envelope (PDE) in its COP, which represents a range of design parameters that could be used for the Project. In reviewing the PDE, BOEM is analyzing the maximum impacting scenario (or maximum-case scenario) that could occur from any combination of the Project parameters. BOEM's analysis and review of the PDE could result in the approval of a project that is constructed within that range or a subset of design parameters within the proposed range.

For the RWF, as proposed in Revolution Wind's COP, each of the up to 100 WTGs would have a nameplate capacity of 8 to 12 megawatts (MW)[1]. The WTGs, OSSs, IACs, and OSS-link cable would be located in the Lease Area approximately 13 nautical miles (nm) (approximately 15 miles) east of Block Island, RI, and approximately 15 nm (approximately 17.25 miles) southeast of the coast of mainland RI. The RWEC would be buried in the seabed within federal OCS and RI state waters. The onshore transmission cabling, OnSS, ICF, and one grid connection would be located in Washington County, RI.

2.1 Background

The RWF is located within the RI/MA WEA where BOEM has conducted previous Section 106 reviews for issuance of the commercial lease and approval of site assessment activities. The Section 106 process was completed through a programmatic agreement (PA)[2] executed June 8, 2012 (BOEM 2012a), prepared concurrently with the BOEM's environmental assessment (EA) for commercial wind lease issuance and site assessment activities on the Atlantic OCS offshore RI and MA (BOEM 2012b, 2013). A commercial lease sale for the RI/MA was held in 2013 and Revolution Wind was the winner of Lease OCS-A 0486 (under its current number designation). Subsequent to award of the lease, Revolution Wind submitted a site assessment plan (SAP) describing the proposed construction and installation, operations and maintenance (O&M), and decommissioning of a stand-alone offshore meteorological data collection

[1] BOEM's EIS also analyzes an alternative that, if selected, would implement a higher nameplate capacity WTG (up to 14 MW assumed for the analysis) than what is in the COP project design envelope. This higher capacity WTG, however, must still fall within the physical design parameters of the PDE and thus within the maximum case design parameters used for evaluating impacts in the EIS and this Finding. It is important to note, however, that under this alternative less than 100 WTGs would be approved and installed, potentially reducing some of the impacts described in this Finding depending on which WTG positions were to be removed.

[2] *Programmatic Agreement among the U.S. Department of the Interior, Bureau of Ocean Energy Management; the State Historic Preservation Officers of Massachusetts and Rhode Island; the Mashpee Wampanoag Tribe; the Narragansett Indian Tribe; the Wampanoag Tribe of Gay Head (Aquinnah); and the Advisory Council on Historic Preservation Regarding the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities Offshore Massachusetts and Rhode Island*

system (Tetra Tech 2016), which BOEM reviewed and approved (BOEM 2017). Section 106 reviews for both the lease issuance and the approval of the SAP were conducted pursuant to the PA (BOEM 2012a). These reviews concluded with a BOEM determination of no historic properties affected for lease issuance, corresponding to the finding of no significant impact (FONSI), consequent to EA finalization on June 4, 2013. NEPA review of the SAP for categorical exclusion (CATEX) documented BOEM's finding of no historic properties affected under Stipulation 1 of the PA, on September 21, 2016 (and for consequent SAP approval on October 12, 2017).

2.2 Undertaking

BOEM has determined that the construction, operation, maintenance, and eventual decommissioning of the Project is the undertaking subject to Section 106 and that the activities proposed in the COP have the potential to affect historic properties. Detailed information about the Project, including the COP and its appendices, can be found on BOEM's website (see https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021). BOEM sent to all consulting parties on February 28, 2022, those appendices to the COP that identify cultural resources and assess historic properties, and on August 1, 2022 BOEM sent revised versions of these documents. These documents contain material that meets the criteria for confidentiality under Section 304 of the NHPA. The COP, as well as its public and confidential appendices on cultural resources, is hereby incorporated by reference into this Finding.

BOEM has elected to use NEPA substitution for the Section 106 review pursuant to 36 CFR 800.8(c) (see also Advisory Council on Historic Preservation [ACHP} 2020; Council on Environmental Quality and ACHP 2013). BOEM's Section 106 review for this undertaking includes the identification and evaluation of historic properties and the assessment of effects for all the action alternatives identified during the NEPA review, in the draft environmental impact statement (EIS) for the Project (BOEM 2022a). The EIS analyzes the impacts of the Project to the human environment and specifically to cultural resources, including historic properties. The NEPA EIS and Section 106 review analyze a total of 13 alternatives (A through F including their variants [C1, C2, D1–D3, E1, and E2]), as presented in Table 4.

Table 4. Description of the Alternatives Reviewed in the Environmental Impact Statement

Alternative	Description
A: No Action Alternative	The COP would not be approved, and the proposed construction and installation, O&M, and eventual decommissioning activities would not occur.
B: Proposed Action Alternative (Proposed Action)	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. The Proposed Action includes up to 100 WTGs ranging in nameplate capacity of 8 to 12 MW sufficient to fulfill at a minimum the existing power purchase agreements (PPAs, totaling 704 MW) and up to 880 MW, the maximum capacity identified in the PDE. The WTGs will be connected by a network of IACs; up to two offshore substations (OSSs)[3] connected by an offshore substation-link cable; up to two submarine export cables co-located within a single corridor; up to two underground

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

	transmission circuits located onshore; and an onshore substation inclusive of up to two interconnection circuits connecting to the existing Davisville Substation in North Kingstown, RI. The Proposed Action includes the burial of offshore export cables below the seabed in both the OCS and RI state waters and a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs.
C: Habitat Impact Minimization Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. To reduce impacts to complex fisheries habitats most vulnerable to permanent and long-term impacts from the Proposed Action, however, certain WTG positions would be omitted while maintaining a uniform east-west and north-south grid of 1 × 1–nm spacing between WTGs. The placement of WTGs would be supported by location-specific benthic and habitat characterizations conducted in close coordination with NMFS. Under this alternative, fewer WTG locations (and potentially fewer miles of IACs) than proposed by the lessee would be approved by BOEM. Under this alternative, BOEM could select one of the following alternatives: • Alternative C1: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east–west/north–south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 65 WTGs would be approved. • Alternative C2: This alternative allows for the fulfillment of the existing three PPAs, which total 704 MW, while omitting WTGs in locations where micrositing is not possible to maintain a uniform east west and north-south grid of 1 × 1–nm spacing between WTGs. Under this alternative, up to 64 WTGs would be approved. Refer to draft EIS Appendix K for background information on the development of the Alternative C1 and C2 layouts.
D: No Surface Occupancy in One or More Outermost Portions of the Project Area Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce conflicts with other competing space-use vessels, WTGs adjacent to or overlapping transit lanes proposed by stakeholders or the Buzzard's Bay Traffic Separation Scheme Inbound Lane, would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. Under this alternative, BOEM could select one, all, or a combination of the following three alternatives, while still allowing for the fulfillment of existing PPAs and up to the maximum capacity identified in the PDE (i.e., 880 MW). • Alternative D1: Removal of the southernmost row of WTGs that overlap the 4-nm east-west transit lane proposed by the Responsible Offshore Development Alliance (RODA), as well as portions of Cox Ledge. Selecting this alternative would remove up to seven WTG positions and associated IACs from consideration. • Alternative D2: Removal of the eight easternmost WTGs that overlap the 4-nm north-south transit lane proposed by RODA. Selecting this alternative would remove up to eight WTG positions and associated IACs from consideration. • Alternative D3: Removal of the northwest row of WTGs adjacent to the Inbound Buzzards Bay Traffic Lane. Selecting this alternative would remove up to seven WTG positions and associated IACs.

	The selection of all three alternatives (i.e., D1, D2, and D3) would eliminate up to a total of 22 WTG locations and associated IACs while maintaining the 1 × 1–nm grid spacing proposed in the COP and as described in Alternative B. Based on the design parameters outlined in the COP, allowing for the placement of 78 to 93 WTGs and two OSSs would still allow for the fulfillment of up to the maximum capacity identified in the PDE (e.g., 880 MW = 74 WTGs needed if 12 MW WTGs are used).
E: Reduction of Surface Occupancy to Reduce Impacts to Culturally-Significant Resources Alternative	The construction and installation, O&M, and eventual decommissioning of a wind energy facility within the PDE and applicable mitigation measures, as described in the COP. However, to reduce the visual impacts on culturally important resources on Martha's Vineyard and in RI, some WTG positions would be eliminated while maintaining the uniform east-west and north-south 1 × 1–nm grid spacing between WTGs. • Alternative E1: Allows for the fulfillment of the existing three PPAs totaling 704 MW, while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 64 WTG positions would be approved. • Alternative E2: Allows for a power output delivery identified in the PDE of up to 880 MW while eliminating WTG locations to reduce visual impacts on these culturally-important resources. Under this alternative, up to 81 WTG positions would be approved. Refer to draft EIS Appendix K for background information on the development of the Alternative E1 and E2 layouts.
F: Selection of a Higher Capacity Wind Turbine Generator	The construction and installation, O&M, and eventual decommissioning of a wind energy facility implementing a higher nameplate capacity WTG (up to 14 MW) than what is proposed in the COP. This higher capacity WTG must fall within the physical design parameters of the PDE and be commercially available to the Project proponent within the time frame for the construction and installation schedule proposed in the COP. The number of WTG locations under this alternative would be sufficient to fulfill the minimum existing PPAs (total of 704 MW and 56 WTGs, including up to five "spare" WTG locations). Using a higher capacity WTG would potentially reduce the number of foundations constructed to meet the purpose and need and thereby potentially reduce impacts to marine habitats and culturally significant resources and potentially reduce navigation risks.

Source: BOEM (2022a:Table 2.1-1)

2.3 Area of Potential Effects

The geographic analysis area, as described for potential impacts to cultural resources (marine, terrestrial, and above ground) in the EIS under NEPA is equivalent to the Project's APE, as defined in the Section 106 regulations. In 36 CFR 800.16(d), the APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties, if any such properties exist." BOEM (2020) defines the Project APE as follows:

- the depth and breadth of the seafloor potentially affected by any bottom-disturbing activities, constituting the marine cultural resources portion of the APE;
- the depth and breadth of terrestrial areas potentially affected by any ground-disturbing activities, constituting the terrestrial cultural resources portion of the APE;

- the viewshed from which renewable energy structures, whether located offshore or onshore, would be visible, constituting the APE for visual impacts analysis; and
- any temporary or permanent construction or staging areas, both onshore and offshore.

This Finding assesses effects only to historic properties within the APE for the Project. These effects include reasonably foreseeable effects caused by the Project that could occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)).

2.3.1 Marine Area of Potential Effects

BOEM (2020) defines the APE for marine cultural resources (hereafter marine APE) as the depth and breadth of the seafloor potentially impacted by bottom-disturbing activities of the Project (Figure A-1 in Appendix A) (SEARCH 2022).

2.3.1.1 Revolution Wind Farm Maximum Work Area

The marine APE encompasses all offshore areas where seafloor-disturbing activities from WTG and OSS foundation construction IAC trenching and installation, boulder relocation, and vessel anchoring could occur. The RWF COP PDE proposes up to 100 WTGs and two OSSs within the extent of the APE. Each potential WTG and OSS foundation location includes up to approximately 3-acres of seafloor disturbance under the maximum-case scenario, for a combined total of approximately 734 acres of horizontal construction disturbance for up to 102 offshore Project foundations, reaching up to a maximum vertical extent of 164 feet below seabed (bsb) for monopile foundations (BOEM 2022a). Under the maximum-case scenario up to 164 miles of IAC and OSS-link cable would be installed, resulting in up to 2,619 acres of seafloor disturbance and reaching cable emplacement depths of up to 10 feet below seafloor (BOEM 2022a). The target IAC and OSS-link cable burial depth requirement for the Project is 4 to 6 feet bsb.

2.3.1.2 Revolution Wind Farm Export Cable Offshore Corridor

The RWEC would span approximately 42 miles through federal waters and RI state waters with landfall near Quonset Point, RI (BOEM 2022a). Combined, the two parallel cables' length would be approximately 84 miles. The RWEC crosses the would span 19 miles of the OCS and 23 miles through RI state waters before reaching landfall (BOEM 2022a). The entire RWEC will be located within a 1,640-foot-wide Project easement (8,349 acres) with the maximum depth of impact extending 13 feet (4 m) below the seafloor (BOEM 2022a). The target RWEC burial depth requirement for the Project is 4 to 6 feet bsb. The maximum-case scenario for horizontal seafloor disturbance of the RWEC would be 1,390 acres of the 8,349 acre-corridor (BOEM 2022a). At the landfall work area, the marine APE also includes workspaces where potential seafloor-disturbing activities associated with horizontal directional drilling (HDD), potentially involving use of an offshore cofferdam, and vessel anchoring could occur. Details of the onshore transition for the RWEC is described with the landfall envelope in Section 2.3.2.1.

2.3.1.3 Offshore Vessel Anchoring

Vessel anchoring for RWF and RWEC construction, operations, maintenance, and decommissioning would disturb up to 3,178 acres of seafloor under the maximum-case scenario (BOEM 2022a). Anchors for cable-laying vessels have a maximum penetration depth of 15 feet (BOEM 2022a). Anchoring would be limited to the RWF maximum work area and the RWEC corridor (see Figure B-1).

2.3.2 Terrestrial Area of Potential Effects

BOEM (2020) defines the APE for terrestrial cultural resources (hereafter terrestrial APE) as the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities of the Project. This includes the areas of the landfall envelope, onshore transmission cable easement, OnSS, and ICF depicted in Figure A-2.

2.3.2.1 Landfall Envelope

Revolution Wind is considering a range of siting options for the RWEC landfall, all of which are encompassed by a 20-acre landfall work area. Within this area, 3.1 acres would be sited, within which ground disturbance associated with the onshore transmission cable construction would occur. The deepest disturbances within the landfall work area would be associated with the HDD construction method for cable emplacement, which could entail the installation of temporary sheet pile anchor walls driven to a depth of approximately 20 feet. The HDD drill itself could reach a depth of up to 66 feet below the seafloor and between the onshore transition joint bays and the offshore exit pits. HDD sediment displacement would be largely confined to the two 3-foot-diameter bore holes.

2.3.2.2 Onshore Transmission Cabling

The width of potential ground disturbance for the onshore transmission cable is assumed to be at the extent of the Project easement, which is 25 feet wide centered along the cable route. The preferred onshore transmission cable route from the landfall location to the OnSS is an approximately 1-mile route that will predominantly follow along paved roads or previously disturbed areas such as parking lots. There are alternative onshore transmission cable routes under consideration within the onshore transmission cable PDE, as depicted on Figure A-2. The maximum-scenario for onshore cable disturbance is 16.7 acres. Although some of the alternative routes under consideration have segments that would be installed in undeveloped vegetated areas, these alternates would mostly be installed within paved roads and parking lots (as with the preferred onshore transmission cable route) and would be approximately the same length. Project-related ground disturbance could extend to a maximum depth of 13 feet below ground level anywhere within the width of this easement. Installation of the onshore transmission cable will impact approximately 3.1 acres; therefore, only a portion of the 16.7-acre onshore transmission cable envelope will actually be impacted by installation of the onshore transmission cable.

2.3.2.3 Onshore Substation and Interconnection Facility

Construction of the OnSS and ICF would together require disturbance of approximately 11 acres within the terrestrial APE (BOEM 2022a). The maximum depth of disturbance within the OnSS and ICF work area limit is 60 feet below ground surface. The OnSS and ICF would have an underground cable connecting them and the ICF would have an overhead cable connecting to the adjacent, existing TNEC Davisville substation.

2.3.3 Visual Area of Potential Effects

The APE for potential visual effects (hereafter visual APE) from the Project consists of onshore coastal areas of Connecticut (CT), New York (NY), RI, and MA. Maximum limits of theoretical visibility are represented by 1-mile, 3-mile, and 40-mile radii for each respective onshore or offshore Project

component (WTG, OSS, OnSS, ICF, or O&M facility); however, these radii do not define the visual APE. Within these radii, the visual APE is defined only by those geographic areas with a potential visibility of Project components and, therefore, the visual APE excludes areas with obstructed views of Project components. Visibility and views of Project components were determined through a viewshed analysis (EDR 2021a, 2021b, 2021c, 2022a). The viewshed analysis applied geographic information system (GIS) modeling to take into account the true visibility of the Project (e.g., visual barriers such as topography, vegetation, and intervening structures that obstruct the visibility of Project components).

Areas with potentially unobstructed views of offshore Project components comprise the APE for above ground historic properties (visual APE); see the shaded visual APE (Offshore Facility Viewshed) and visual APE (Onshore Facility Viewshed) areas in Figures A-3 and A-4. Figure A-4 also depicts reasonably foreseeable future project areas for consideration of cumulative effects within the visual APE.

2.3.3.1 Onshore Project Components

Onshore Project facilities with above ground components include the OnSS and ICF, and these components have a viewshed radius of 3 miles. Onshore Project components where redevelopment of existing facilities could occur (O&M facilities) have a viewshed radius of 1 mile around and include potential O&M facilities at the Port of Davisville at Quonset Point and Port Robinson. The 1-mile radius at the Port of Davisville at Quonset Point O&M facility is completely subsumed within the 3-mile radius around the ICF and OnSS (Figure A-3).

The horizontal extent of the OnSS and ICF, as described under the terrestrial APE at Section 2.3.2.3, would be within an 11-acre area of disturbance. The maximum height of OnSS and ICF equipment would be up to 45 feet above ground, with OnSS shielding masts extending further, up to 65 feet, and the ICF overhead transmission circuit structures reaching up to 80 feet above ground (BOEM 2022a). Facility lighting was considered in the analysis of visual effects.

2.3.3.2 Offshore Project Components

Offshore Project components (e.g., WTGs) have a viewshed radius of 40 miles around the edge of the Lease Area (Figure A-4). The Project [redacted] extends to above ground historic properties in the following cities and towns (EDR 2022a):

- RI—Bristol, Charlestown, Cranston, East Greenwich, Exeter, Jamestown, Little Compton, Middletown, Narragansett, New Shoreham, Newport, North Kingstown, Portsmouth, South Kingstown, Tiverton, Warwick, and Westerly;
- MA—Acushnet, Aquinnah, Barnstable, Bourne, Chilmark, Dartmouth, Edgartown, Fairhaven, Fall River, Falmouth, Gosnold, Marion, Mattapoisett, Nantucket, New Bedford, Swansea, Tisbury, Wareham, West Tisbury, and Westport;
- NY—East Hampton and Southold; and
- CT—Groton.

Above ground historic property distribution in the visual APE is mapped on Figure A-4. APE delineation and historic property identification assessed the potential visibility of a WTG from the water level to the

tip of an upright rotor blade at a height of 873 feet and further considered how distance and curvature of the Earth affect visibility as space between the viewing point and WTGs increases (EDR 2021c, 2022a). Potential WTG and OSS locations and spacing in the Project Lease Area also informed analyses, including when combined with the cumulative development of other reasonably foreseeable offshore wind developments (EDR 2021b). The analysis further considered the nighttime lighting of offshore structures and construction lighting.

3 Steps Taken to Identify Historic Properties

3.1 Technical Reports

To support the identification of historic properties within the APE, Revolution Wind has provided survey reports detailing the results of multiple investigations within the APE (marine, terrestrial, and visual). Table 5 provides a summary of these efforts to identify historic properties and the key findings/recommendations of each investigation. BOEM has reviewed and accepted all reports summarized in Table 5. BOEM found that the preliminary APE identified by Revolution Wind are appropriate for the magnitude, extent, location, and nature of the undertaking; that the reports collectively represent a good faith effort to identify historic properties within the APE; and that the reports are sufficient to apply the Criteria of Adverse Effect (see Section 4) and to continue consultations with consulting parties for taking into account and resolving adverse effects to historic properties.

3.1.1 Report Summary – Marine

The Marine Archaeological Resources Assessment (MARA) provides the results of the archaeological survey of the seafloor and seabed within the marine APE for historic properties, largely represented by ASLFs and shipwrecks/possible historic shipwrecks. ASLFs represent submerged lands—ancestral lands to today's Tribal Nations—that were inundated by approximately 8,000 years before present (B.P.), with submersion taking several thousand years at the beginning of the Holocene epoch, following the last ice age. Shipwrecks and similar submerged craft or structures of the type found to date were sank within the past 400 years, after European colonization of New England. Historic properties (shipwrecks/possible historic shipwrecks and ASLFs) located in the marine APE in the RWF Lease Area and the RWEC corridor are depicted in Appendix B (Figure B-1) (SEARCH 2022:Figure 4-1). Appendix B contains sensitive historic property location information that meet the criteria for confidentiality under Section 304 of the NHPA and, for this reason, is detached from the publicly available copies of the Finding.

3.1.2 Report Summary – Terrestrial

The Terrestrial Archaeological Resources Assessment (TARA) provides the results of land-surface and subsurface-onshore archaeological survey (Phase I archaeological survey) of the terrestrial APE. The RWEC would transition from sea to shore at Quonset Point in RI. Quonset Point is in an area [redacted] extending to the west and southwest of the terrestrial APE (Forrest and Waller 2021). However, construction, operations, decommissioning, and large-scale redevelopment of former military facilities at Quonset Point following World War II has substantially altered the terrestrial APE. Intact pockets of natural soils represent a small percentage of all surficial earth. The proposed OnSS site was used as a general dump site during naval operations (1940s through 1960s); several hundred tons of debris and soil were removed from this dump site during remediation activities in the late 1990s. The pockets of relatively intact natural soils within the terrestrial APE are located within [redacted] work area limits and along the southern margins of the landfall area (Forrest and Waller 2021).

The Public Archaeology Laboratory, Inc. (PAL) contacted the RIHPHC and the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, and Mohegan Tribe of Indians of Connecticut Tribal Nations to consider and address tribal

concerns within its Phase I archaeological survey area. The archaeological survey [redacted] of the terrestrial APE identified four [redacted] archaeological resources (Forrest and Waller 2021). PAL did not conduct remote sensing (ground-penetrating radar, soil resistivity, magnetometry, or similar techniques). Dense surface vegetation made remote sensing impractical, and twentieth-century dumping, filling, and other ground disturbances and landscape modifications would have produced inconclusive results. The RIHPHC also has not favored remote sensing as a method sufficiently reliable for archaeological site identification in and of itself, preferring ground truthing instead to include the excavation of test pits or other excavation units.

3.1.3 Report Summary – Visual

The onshore and offshore Historic Resources Visual Effects Analyses (HRVEAs) and cumulative HRVEA (CHRVEA) identify the range of above ground historic properties identified in the visual APE for onshore and offshore project facilities, elements, or components (interchangeably). The CHRVEA builds from the results of the HRVEAs to assess where the effects of the Project may combine cumulatively with those of other reasonably foreseeable offshore wind projects (SWCA 2022).

For the onshore components' viewshed, the HRVEA identified a total of 80 above ground viewshed resources, within 3 miles of the proposed OnSS and ICF, that consist of 16 NRHP-listed properties, two properties that have been determined by the RIHPHC to be eligible for the NRHP, nine properties included in the RIHPHC inventory but without formal determinations of NRHP eligibility, and 53 RIHCC-identified Rhode Island Historical Cemeteries (EDR 2021a). Viewshed analyses determined that of these 80 viewshed resources, two are within the visual APE. These two resources are located within the viewshed of the OnSS and ICF. The viewshed analysis determined that neither are within the viewshed of any of the five potential O&M facility locations considered in the COP. At 1.1 miles away from the OnSS and ICF location is the NRHP-listed Wickford Historic District; at 0.25 mile away is the Quonset Point Naval Air Station, determined by the RIHCC to be NRHP eligible (EDR 2021a). The historic Quonset Point Naval Air Station is also addressed in the offshore HRVEA (EDR 2022a).

In relation to the offshore Project components, the HRVEA identified a total of 451 above ground historic properties within the visual APE that consist of 97 NRHP-listed properties, 69 historic properties that have been determined eligible for the NRHP, six TCPs, 279 properties included in the RIHPHC, Massachusetts Historical Commission (MHC), or local historic inventories but without formal determinations of NRHP eligibility (EDR 2022a). Those without formal determinations of NRHP eligibility are treated as historic properties in the HRVEA and in this Finding. Twelve of the NHRP-listed viewshed resources are also NHLs (EDR 2022a). These are the Montauk Point Lighthouse, Block Island Southeast Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, Marble House, and William Watts Sherman House. Three resources documented specifically due to their categorization as TCPs in MA consist of the [redacted] TCP, the [redacted] TCP, and the [redacted] TCP. These TCPs are represented by broad, complex cultural landscapes and connected seascapes (EDR 2022a). The [redacted] TCP is NRHP listed and the [redacted] TCP and the [redacted] TCP have previously been determined NRHP eligible by BOEM.

Table 5. Cultural Resources Investigations Performed by Revolution Wind in the Area of Potential Effects (Marine, Terrestrial, and Visual)

Portion of APE	Report	Description	Key Findings/Recommendations
Offshore	*Marine Archaeological Resources Assessment* (SEARCH 2022)	Assessment of marine archaeological resources through remote sensing technologies of the marine APE	This MARA identified 19 shipwrecks/possible historic shipwrecks and 10 geomorphic features (ASLFs) of archaeological interest. SEARCH concluded avoidance is possible for 20 of these historic property types through a 164-foot (50-meter) buffer in radius around the extent of the identified resource. Full avoidance was determined is not feasible at the remaining nine ASLFs and further action was recommended as necessary.*
Onshore	*Terrestrial Archaeological Resources Assessment Revolution Wind Farm Project Onshore Facilities* (Forrest and Waller 2021)	Phase I archaeological survey for the onshore components to identify terrestrial archaeological sites	This TARA identified four [redacted] archaeological sites. Two of the sites, [redacted] #1 and [redacted] #2, were recommended eligible for the NRHP under Criteria A and D. Full avoidance of the two historic properties was determined not feasible and further action was recommended as necessary (Forrest and Waller 2021).*
Visual	*Visual Impact Assessment and Historic Resources Visual Effects Analysis Revolution Wind Onshore Facilities* (EDR 2021a)	Report analyzing the viewsheds surrounding the O&M, OnSS, and ICF facilities proposed for Quonset Business Park/Quonset Point	This HRVEA identified 80 above ground historic properties within 3 miles of the proposed OnSS and ICF. Viewshed analyses determined that a total of two above ground historic properties are located within the viewshed of the OnSS and ICF but are not within the viewshed of any of the five potential O&M facility locations. One of these historic properties, the Quonset Point Naval Air Station, is additionally reviewed in the offshore HRVEA (EDR 2022a). No adverse effects were found to above ground historic properties from proposed onshore project components (EDR 2021a).

Portion of APE	Report	Description	Key Findings/Recommendations
Visual	*Historic Resources Visual Effects Analysis Revolution Wind Farm* (EDR 2022a)	Report analyzing the viewsheds from the WTGs and OSS through GIS modeling to determine the area of Project visibility and define the APE for historic properties sensitive to visual effects	This HRVEA identified 451 above ground historic properties within the APE, including 12 NHLs and six TCPs. These historic properties were analyzed with respect to the potential for visual effects. They were assessed according to the visibility of the offshore Project WTGs and OSS and potential Project effect on the characteristics of historic properties that make them eligible for NRHP listing. A total of 101 above ground historic properties would be adversely affected by the Project under maximum potential visibility (EDR 2022a). BOEM's further analysis of these results in the CHRVEA finds that the combined visual effects of the Project with those of other reasonably foreseeable offshore wind projects would additionally result in cumulative adverse effects to these 101 historic properties (SWCA 2022). These 101 include five NHLs and two TCPs. Full avoidance of visual effects to the 101 historic properties was determined not feasible and further action was recommended as necessary in the HRVEA and CHRVEA.*

* Note: In confidential COP Appendix BB (EDR 2022c), Revolution Wind has proposed further measures to avoid, minimize, and mitigate adverse effects from the Project to historic properties. BOEM continues meeting with consulting parties to take into account the effects of the undertaking on historic properties and to reach resolution of adverse effects through preparation and implementation of a memorandum of agreement (MOA). BOEM has drafted avoidance, minimization, and mitigation measures for historic properties in both the MOA and the historic property treatment plans attached to the MOA.

3.2 Consultation and Coordination with Consulting Parties and the Public

3.2.1 Early Coordination

Since 2009, BOEM has coordinated OCS renewable energy activities for the RI/MA and MA WEAs with its federal, state, local, and tribal government partners through its intergovernmental Renewable Energy Task Force. BOEM has met regularly with federally recognized Native American Tribal Nations (Tribal Nations) that could be affected by renewable energy activities in the area since 2011, specifically during planning for the issuance of offshore wind energy leases and review of site assessment activities proposed for those leases. BOEM also hosts public information meetings to update interested stakeholders on major renewable energy milestones. Information on BOEM's RI/MA and MA Renewable Energy Task Force meetings is available at https://www.boem.gov/Massachusetts-Renewable-Energy-Task-Force-Meetings, and information on BOEM's stakeholder engagement efforts is available at https://www.boem.gov/renewable-energy/state-activities/public-information-meetings.

3.2.2 National Environmental Policy Act Scoping and Public Hearings

On April 30, 2021, BOEM published the notice of intent (NOI) to prepare an EIS for the Revolution Wind COP and published a revised NOI on June 4, 2021 (BOEM 2021a; BOEM 2021b), extending the public scoping period to June 11, 2021. The purpose of the NOI was to announce BOEM's intent to prepare an EIS and to start the public scoping period for the NEPA effort wherein BOEM solicits public input on issues of concern and potential alternatives to be considered in the EIS. Through this notice, BOEM announced that it would use the NEPA substitution process for the Section 106 review for this undertaking, in accordance with Section 106 implementing regulations.

During the public scoping period, BOEM held three virtual scoping meetings for consulting parties and the public, which included specific opportunities for engaging on issues relative to Section 106 for the Project, on Thursday, May 13; Tuesday, May 18; and Thursday, May 20, 2021. Through the NEPA scoping process, BOEM received comments related to cultural, historic, archaeological, and tribal resources. BOEM's EIS scoping report includes these comments (BOEM 2022b).

BOEM intends to publish a notice of availability of the draft EIS for the COP in early September 2022. As part of this process, BOEM will hold a 45-day comment period and public meetings, providing further opportunity for engagement on issues pertinent to Section 106 review.

3.2.3 Section 106 Consultation

BOEM sent Section 106 consultation invitations to 127 potential consulting parties pursuant to 36 CFR 800.3(f) of the Section 106 regulations, via mail and email between April 2 and 30, 2021. Additional consulting parties were invited throughout the consultation process, as they were identified. Throughout spring and early summer 2021, as third-party consultant to BOEM, SWCA Environmental Consultants (SWCA) followed up with parties to confirm preferred points of contact and interest in participating. The organizations BOEM invited to consult beginning in April 2021 are listed in Table 6.

Table 6. Parties Invited to Participate in 106 Consultation

Participants in the Section 106 Process	Invited Consulting Parties
SHPOs and state agencies	Connecticut State Historic Preservation Office
	Connecticut Department of Economic and Community Development
	RIHPHC
	New York State Division for Historic Preservation
	MHC
	Massachusetts Board of Underwater Archaeological Resources
	Massachusetts Commissioner on Indian Affairs
	Rhode Island Department of Environmental Management
Federal agencies	National Park Service (NPS)
	National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division
	U.S. Army Corps of Engineers, New England District
	U.S. Army Corps of Engineers, New York District
	Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E))
	Naval Facilities Engineering Systems Command Headquarters– Cultural Resources
	Naval History and Heritage Command – Underwater Archaeology Branch
	Bureau of Safety and Environmental Enforcement
	U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning
	U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment
	ACHP
	U.S. Coast Guard -Sector SE New England
	U.S. Coast Guard - Marine Transportation Systems (CG-5PW)
	U.S. Coast Guard – First Coast Guard District
	U.S. Fish and Wildlife Service
	Environmental Protection Agency
	Federal Aviation Administration

Participants in the Section 106 Process	Invited Consulting Parties
Federally recognized Tribal Nations	Mashpee Wampanoag Tribe
	Shinnecock Indian Nation
	Mashantucket Pequot Tribal Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
	Mohegan Tribe of Indians of Connecticut
	Narragansett Indian Tribe
	Delaware Tribe of Indians
	The Delaware Nation
Non-federally recognized Tribal Nations	Chappaquiddick Tribe of Wampanoag Nation
	The Golden Hill Paugussett
	Eastern Pequot Tribal Nation
	Schaghticoke Tribal Nation
	Unkechaug Nation
Local governments	Cape Cod Commission
	City of Newport
	County of Dukes (MA)
	Town of Charlestown
	Town of East Hampton
	Town of Middletown
	Town of Nantucket
	Nantucket Planning & Economic Development Commission
	Town of Narragansett
	Town of North Kingstown
	City of Cranston
	City of East Providence
	City of Fall River
	City of New Bedford
	City of Providence
	City of Rehoboth
	City of Taunton
	County of Barnstable (MA)
	County of Bristol (MA)
	County of Plymouth (MA)
	County of Suffolk (NY)

Participants in the Section 106 Process	Invited Consulting Parties
	Town of Acushnet
	Town of Aquinnah
	Town of Barnstable
	Town of Barrington
	Town of Berkley
	Town of Bourne
	Town of Bristol
	Town of Chilmark
	Town of Coventry
	Town of Dartmouth
	Town of Dighton
	Town of East Greenwich
	Town of Edgartown
	Town of Exeter
	Town of Fairhaven
	Town of Falmouth
	Town of Freetown
	Town of Gosnold
	Town of Griswold
	Town of Groton
	Town of Hopkinton
	Town of Jamestown
	Town of Johnston
	Town of Lakeville
	Town of Ledyard
	Town of Little Compton
	Town of Marion
	Town of Mashpee
	Town of Mattapoisett
	Town of Middleborough
	Town of Nantucket
	Town of New Shoreham
	Town of North Stonington
	Town of Oak Bluffs

Participants in the Section 106 Process	Invited Consulting Parties
	Town of Portsmouth
	Town of Richmond
	Town of Rochester
	Town of Sandwich
	Town of Scituate
	Town of Seekonk
	Town of Somerset
	Town of South Kingstown
	Town of Southold
	Town of Stonington
	Town of Swansea
	Town of Tisbury
	Town of Tiverton
	Town of Voluntown
	Town of Wareham
	Town of Warren
	Town of Warwick
	Town of West Greenwich
	Town of West Tisbury
	Town of West Warwick
	Town of Westerly
	Town of Westport
Non-governmental organizations or groups	Alliance to Protect Nantucket Sound
	Balfour Beatty Communities
	Block Island Historical Society
	Bristol Historical and Preservation Society
	East Greenwich Historic Preservation Society
	Gay Head Lighthouse Advisory Committee
	Martha's Vineyard Commission
	Montauk Historical Society
	Newport Historical Society
	Newport Restoration Foundation
	Preservation Massachusetts
	Rhode Island Historical Society

Participants in the Section 106 Process	Invited Consulting Parties
	Salve Regina University
	Southeast Lighthouse Foundation
	The Preservation Society of Newport County
	Revolution Wind (lessee)

Entities that responded to BOEM's invitation to consult or were subsequently made known to BOEM and added as consulting parties are listed in Table 7.

Table 7. Consulting Parties Participating in 106 Consultation

Participants in the Section 106 Process	Participating Consulting Parties
SHPOs and state agencies	Connecticut State Historic Preservation Office
	Connecticut Department of Economic and Community Development
	RIHPHC
	New York State Division for Historic Preservation
	MHC
	Rhode Island Department of Environmental Management
Federal agencies	NPS
	U.S. Army Corps of Engineers, New England District
	U.S. Army Corps of Engineers, New York District
	Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E))
	Naval Facilities Engineering Systems Command Headquarters–Cultural Resources
	Naval History and Heritage Command – Underwater Archaeology Branch
	U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning
	U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment
	ACHP
	Bureau of Safety and Environmental Enforcement
	U.S. Coast Guard -Sector SE New England
	U.S. Coast Guard - Marine Transportation Systems (CG-5PW)
	Environmental Protection Agency

Participants in the Section 106 Process	Participating Consulting Parties
	Federal Aviation Administration
Federally recognized Tribal Nations	Mashpee Wampanoag Tribe
	Shinnecock Indian Nation
	Mashantucket Pequot Tribal Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
	Mohegan Tribe of Indians of Connecticut
	Narragansett Indian Tribe
	Delaware Tribe of Indians
	The Delaware Nation
Non-federally recognized Tribal Nations	Chappaquiddick Tribe of Wampanoag Nation
	Unkechaug Nation
Local governments	City of Newport
	County of Dukes (MA)
	Town of Charlestown
	Town of East Hampton
	Town of Middletown
	Town of Nantucket
	Nantucket Planning & Economic Development Commission
	Town of Narragansett
	Town of North Kingstown
	Town of New Shoreham
Nongovernmental organizations or groups	Block Island Historical Society
	Gay Head Lighthouse Advisory Committee
	Newport Restoration Foundation
	The Preservation Society of Newport County
	Rhode Island Historical Society
	Salve Regina University
	Southeast Lighthouse Foundation
	Revolution Wind (lessee)

On January 15–17, July 21 and 27, and August 20, 2020; on March 12 and April 9 and August 2 and 13, 2021; and on February 3, May 2, and June 1 and 2, 2022, BOEM met with federally recognized Tribal Nations to simultaneously discuss multiple BOEM actions. Officials with the Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, and Wampanoag Tribe of Gay Head (Aquinnah) have

attended Project cooperating agency meetings to date. BOEM received comments from the Tribal Nations during June 2021 cooperating agency meetings in the scoping of Project alternatives and weighed these in the identification of alternatives to consider in detailed EIS analyses (BOEM 2022a). See EIS Appendix A at *Government-to-Government Consultation with Federally Recognized Indian Tribes* (BOEM 2022a). The Mohegan Tribe of Indians of Connecticut, the Mashantucket Pequot Tribal Nation, the Narragansett Indian Tribe, the Wampanoag Tribe of Gay Head (Aquinnah), the Mashpee Wampanoag Tribe, the Shinnecock Indian Nation, the Delaware Nation, and the Delaware Tribe of Indians participated in various of the meetings. BOEM continues to consult with these and other Tribal Nations on developments in offshore wind and the Project. BOEM is planning additional government-to-government consultations for the future.

In correspondence and subsequent consultation meetings, BOEM requested information from consulting parties on defining the APE and identifying historic properties potentially affected by the proposed undertaking. BOEM held an initial Section 106 virtual consultation meeting with consulting parties on December 17, 2021, reviewing the Project background; NEPA substitution in the Section 106 process, consultation schedule, and timing; and Section 110(f) consultation requirements and BOEM's compliance with these requirements. On February 28, 2022, the historic properties assessment/analysis reports were distributed to consulting parties (MARA, TARA, HRVEAs, and CHRVEA). BOEM held a second Section 106 virtual consultation meeting with consulting parties on April 8, 2022, reviewing technical report information and the agency's preliminary assessment of historic properties. BOEM provided a revised MARA (SEARCH 2022), offshore HRVEA (EDR 2022a), CHRVEA (SWCA 2022) and accompanying documents (i.e., a memo on HRVEA [EDR 2022b], documentation of response to comments on historic properties assessment and analysis reports, and an updated consultation schedule), and redistributed the previously provided TARA (Forest and Waller 2021) and the onshore HRVEA (EDR 2021a), in August 2022. In the updated schedule, BOEM has planned the third Section 106 virtual consultation meeting with consulting parties for September 2022, reviewing the changes to the historic properties assessment/analysis reports and the Finding and draft MOA. Meeting summaries and access to recordings of the meetings were made available to consulting parties following each meeting.

In spring 2022, consulting parties provided comments on the distributed historic properties assessment and analysis reports on the identification of historic properties and preliminary considerations of effect on these properties as presented in the MARA, TARA, HRVEAs, and CHRVEA. BOEM's response to these comments were provided in a response-to-comment document release with, and are reflected in, the revised versions of the historic properties assessment/analysis reports, which were distributed to consulting parties in August 2022.

BOEM will continue meeting with consulting parties to take into account the effects of the undertaking on historic properties and to reach resolution of adverse effects through preparation and implementation of a MOA. A draft MOA was provided by BOEM to consulting parties with the release of this Finding.

4 Application of the Criteria of Adverse Effect

The Criteria of Adverse Effect under Section 106 (36 CFR 800.5(a)(1)) states that an undertaking has an adverse effect on a historic property when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. According to the regulations (36 CFR 800.5(a)(2)), adverse effects on historic properties include, but are not limited to:

i. physical destruction of or damage to all or part of the property;

ii. alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;

iii. removal of the property from its historic location;

iv. change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

v. introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

vi. neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian Tribe [Tribal Nations] or Native Hawaiian organization; and

vii. transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

4.1 Adversely Affected Historic Properties

4.1.1 Assessment of Effects to Historic Properties in the Marine Area of Potential Effects

As noted in the Introduction (Section 1) to this Finding, BOEM has determined that the undertaking would have an adverse effect on nine historic properties (NRHP-eligible marine cultural resources) within the marine APE (see Table 1). Each of these are ASLF features.

Archaeological surveys within the marine APE identified 29 historic properties within the RWF maximum work area (SEARCH 2022). Of these, 19 are shipwrecks/possible historic shipwrecks and 10 are geomorphic features (ASLFs) of archaeological interest. [redacted]

4.1.1.1 Shipwrecks and Possible Historic Shipwrecks

All 19 shipwrecks/possible historic shipwrecks would be avoided with sufficient buffers by all proposed Project activities that are part of the undertaking, and as a result, there would be no effects to these potential historic properties (SEARCH 2022). Revolution Wind has established a protective buffer extending 50 m (164 feet) from the maximum discernable extent of the shipwreck or unidentified sonar and/or magnetic anomalies delineated in the high-resolution remote sensing survey data sets and would avoid seafloor-disturbing activities within this buffer during construction, operations, and decommissioning activities (SEARCH 2022). BOEM has determined the protective buffer to be sufficient and would require its implementation as a condition of approval if the COP is approved. Because the Project would avoid adverse effects to these shipwrecks/possible historic shipwrecks, which would be eligible for the NRHP based upon their ability to contribute further important historic and archaeological research information under NRHP Criterion D and/or their role in important events in history under NRHP Criteria A, this Finding does not go into detail on their significance and integrity; for greater detail, see the MARA (SEARCH 2022).

4.1.1.2 Ancient Submerged Landforms

As part of the MARA, SEARCH conducted for the COP an inclusive search of pre-contact period archaeological sites (i.e., archaeological sites that were once part of the terrestrial landscape and have since been inundated by global sea level rise during the late Pleistocene and early Holocene) (see BOEM 2020). Revolution Wind followed BOEM (2020), *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR 585*, in identifying and delineating ASLFs and ASLF features with archaeological potential in the marine APE, as described in the MARA (SEARCH 2022). These features may derive their significance from reasons other than their archaeological potential, such as their potential contribution to a broader culturally significant landscape. The MARA applied high-resolution geophysical survey utilizing magnetometer/gradiometer and side-scan sonar, sub-bottom profiler, and seismic data sets to identify ASLF targets or features, then developed a geotechnical testing strategy for collection of vibracore samples to a maximum depth of 20 feet to further refine targets that could be an ancient submerged landscape (SEARCH 2022: Section 3.6).

The vibracore samples recovered were subjected to macrobotanical, pollen, faunal, and radiocarbon sample analyses to further support the identification of marine archaeological sites and to inform the broader paleolandscape reconstruction (SEARCH 2022). Please see the MARA for details on the methods and results of these investigations. Although 10 ASLFs and features were identified that exhibit high archaeological potential, no evidence of human occupation associated with the ASLFs or ASLF features was identified in core samples taken during the submerged cultural resources investigation (SEARCH 2022:Section 5).

The offshore RWF area was once exposed as dry land at the end of the last ice age. Glacial retreat exposed the area beginning approximately 24,000 years before present (B.P.), and it remained exposed until between 11,000 and 8,000 B.P. when sea levels rose to submerge the area (SEARCH 2022). ASLFs are the formerly terrestrial landscapes exposed between the time of glacial retreat and submersion by the sea. Features identified as discrete surviving remnants of these landscapes, albeit submerged, are persisting areas [redacted]. ASLFs are a finite resource that [redacted]

[redacted] serve as an archaeological and scientific source of information for understanding the past climatic regimes, landscapes, and resources present [redacted] during ancient times. [redacted] (Joy 2018; SEARCH 2022). Additionally, low-lying areas only require low-energy sea level rise to reach inundation. With the onset of rapid sea level rise however, these same low-lying environments could have been submerged deeply and quickly, leading to potentially deeply buried, intact former terrestrial soils with higher preservation potential than high-elevation areas (SEARCH 2022). As such, using seismic data sets, sub-bottom profiler data, and preliminary ground model and geologic interpretation SEARCH employed a paleoreconstruction model within the RWF and RWEC areas to identify the ASLFs with the highest potential for preservation. The MARA identified 10 total ASLF features (Target-21 through Target-30). Of these 10, five are located within the RWEC corridors (Target-21, Target-22, Target-29, and Target-30 within the RWEC in RI and Target-23 within RWEC on the OCS) and five are located within the RWF area (Target-24 through Target-28) (see Table 1). Horizontal and vertical extents of the 10 ASLFs are presented in Section 5 of the MARA, in detail. Of these 10 targets, the MARA states explicitly:

> [redacted] The extent of the intact geomorphic features of archaeological interest within the APE is relatively minimal due to the relatively shallow impacts of the cable installation process, wind turbine layout, and marine transgression. (SEARCH 2022:196).

The MARA identified that nine of the 10 ASLFs (all except Target-27) could be impacted by proposed Project activities, with the recommendation for further consultation to evaluate these nine features. The MARA identified that the RWF and RWEC areas have been subject to heavy erosion and redistribution of sediments through glacial and marine processes, thereby diminishing the chance of identifying persevered, intact ASLFs except for the 10 identified here (SEARCH 2022:Section 6). The majority of the Project's seafloor disturbance—in areas where ASLFs occur—is limited to 3 to 4 m (10 to 13 feet) bsb. [redacted] (SEARCH 2022).

Although geomorphic features (the ASLFs) exhibit high archaeological potential; as the MARA notes, no evidence of human occupation associated with the ASLFs was identified in core samples taken during the submerged cultural resources investigation (SEARCH 2022).

The 10 identified ASLFs are NRHP eligible at minimum for their connection to broad events within [redacted] history under NRHP Criterion A and for their ability to contribute further information to the understanding of that history under NRHP Criterion D, pursuant to 36 CFR 800.16(l) (SWCA 2021a). All ASLF and ASLF features identified in the APE are categorized as sites [redacted] in accordance with the NRHP evaluation criteria (see SWCA 2021a). The 10 ASLF and ASLF features are individually eligible under Criterion A for their associations [redacted]. They are individually eligible under Criterion D for the potential to yield important cultural, historical, and scientific information [redacted] prior to 8,000 B.P. Consistent with NRHP Bulletin 15, natural features or sites "unmarked by cultural materials" can be eligible under Criterion D where "the study of the feature, or its location, setting, etc… will yield important information about the event or period with which it is associated" under Criterion A, and "usually in the context of data gained from other sources" (NPS 1997:22).

The ASLF and ASLF features identified within the APE each retain integrity of location, setting, association, and feeling. [redacted]. ASLFs occupy a unique location within a relict terrestrial landscape and the information that their paleosols and positions on the landscape may provide is important in understanding the earliest history of the region (SWCA 2021a). All ASLF and ASLF features were identified in the APE through confirmation of evidence of relict terrestrial surfaces or sediments.

Integrity of setting is important to ASLFs and ASLF features. [redacted] (SWCA 2021a). [redacted] The 10 ASLF features in the marine APE for the Project retain their integrity of setting.

Integrity of association is important for connection of ASLFs and ASLF features [redacted] (SWCA 2021a). The 10 ASLF features in the marine APE for the Project continue to convey these associations [redacted].

Integrity of feeling is key to the significance of these properties [redacted]. Though now submerged, the ASLFs document the paleoclimate [redacted] through palynological, geochemical, and other analysis points of the prehistoric natural environment. These ASLFs and ASLF features provide well-preserved evidence of the landscape [redacted] (SWCA 2021a). [redacted]

[redacted] (SWCA 2021a). The 10 ASLF features in the marine APE for the Project retain their integrity of feeling. Under NRHP Criteria B and C, insufficient information is available to determine eligibility for the 10 ASLF in the marine APE for the Project.

ASLFs and ASLF features are preserved under limited conditions, making persisting sites rare examples of the property type. However, they retain [redacted] their historic character and significance (SWCA 2021a), in accordance with NRHP Bulletin 15 (NPS 1997). No cultural materials, patterns of design, or elements of workmanship have yet been identified at these ASLFs or ASLF features. The 10 ASLF features in the marine APE for the Project are not known to retain integrity of material, workmanship, and design.

BOEM has found that the Project would result in adverse effects to nine of the 10 ASLFs within the RWF and RWEC areas; however, Revolution Wind would use micrositing of project cabling and WTGs to the extent able to avoid these adverse effects (e.g., by placing cabling in younger sediments [redacted]). In the terms of the Criteria of Adverse Effect, where the ASLFs are not avoidable, the undertaking would result in the permanent irreversible physical destruction at or damage to nine of the ASLF features (excluding ASLF Target-27). [redacted] At Target-21, Target-22, Target-23, Target-29, and Target-30, [redacted] impacts would be limited and could be minimized by micrositing (SEARCH 22). At Target-24, [redacted] impacts would be limited and could be minimized by micrositing (SEARCH 22). Target-25 may not be avoidable by WTG placement under the maximum case scenario, however, could be avoidable by alternatives where fewer than 100 WTGs would be constructed. At Target-25, [redacted] impacts would be limited and could be minimized by micrositing (SEARCH 22). At Target-26, [redacted] direct impacts would be unlikely and could be avoided by micrositing (SEARCH 22). Project siting would avoid the known extent of Target-27 by an avoidance distance of over 165 feet (50 m) from the Target-27 feature extent. At Target-28, WTG placement and workspaces could be microsited to avoid [redacted] the maximum-case scenario for the IAC (SEARCH 22).

4.1.2 Assessment of Effects to Historic Properties in the Terrestrial Area of Potential Effects

BOEM has determined that the undertaking would have an adverse effect on two historic properties ([redacted] archaeological sites) within the terrestrial APE (see Table 2). Overall, the TARA identified four [redacted] archaeological resources. [redacted] (Forrest and Waller

2021). [redacted] #1 archaeological site and the [redacted] #2 archaeological site are eligible for NRHP listing under Criteria A and D and are archaeologically significant (see Table 2).

> [redacted] #1 . . . likely contains significant new information [redacted] #1 is eligible for listing in the National Register under Criteria A and D. (Forrest and Waller 2021:4-24)

> [redacted] #2 Site may contain significant new information [redacted] #2 Site is eligible for listing in the National Register under Criteria A and D. (Forrest and Waller 2021:4-25)

Revolution Wind is committed to avoiding or minimizing impacts to these sites to the best extent feasible. However, [redacted] plans are unlikely to be able to fully avoid impacts to these two historic properties, and adverse effects would result. Therefore, BOEM will continue to consult with the Tribal Nations, Revolution Wind, other federal and state agencies, and consulting parties to develop and implement an archaeological mitigation/treatment plan to resolve adverse effects that Project construction would have on the [redacted] #1 and [redacted] #2 sites. These mitigation measures would be made a requirement of the MOA for the project. [redacted]

4.1.3 Assessment of Effects to Historic Properties in the Visual Area of Potential Effects

BOEM has determined that the undertaking will have an adverse effect on 101 historic properties within the visual APE for offshore development (see Table 3). Of the 101 above ground historic sites and districts in the visual APE that could be susceptible to visual adverse impacts from the offshore components of the Project, 37 are listed on the NRHP (five of which are also NHLs) and the remaining 64 are properties that have been determined to be eligible for the NRHP (a total of 33) or (a total of 31) are included in the inventories of the RIHPHC, MHC, or local entities with final determinations of NRHP eligibility pending. The 101 adversely affected above ground historic properties are coastal properties

with open ocean viewsheds toward the RWF. They include five NHLs in RI: Southeast Lighthouse on Block Island and Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, and Marble House at Newport. They include two TCPs in MA [redacted].

Although the visual APE for onshore development also contains two historic properties in the viewshed of the OnSS and ICF, BOEM has determined that no adverse effects would result at these two historic properties. The historic Quonset Point Naval Air Station and Wickford Historic District are within the visual APE of the OnSS and ICF; however, these onshore Project facilities would be in scale and character with the current use of the Quonset Point Naval Air Station and would not introduce contrasting visual elements inconsistent with either that naval air station or with the existing setting of the Wickford Historic District (BOEM 2021a). Although the historic Quonset Point Naval Air Station is also in the range of potential physical effects due to the potential construction of the Project's RWEC landfall and onshore cable siting on Quonset Point, BOEM has determined that physical Project disturbance would not dimmish the integrity of the Quonset Point Naval Air Station and no adverse effects would result.

The HRVEA identified the 101 adversely affected historic properties from 451 above ground historic properties in the viewshed of offshore project components and therefore in the visual APE; 246 of these are in MA, 197 in RI, 6 in NY, and 2 in CT (EDR 2022a:Table 3.1.1-1 and Attachment A). To determine visual APE intersections with these 451 historic properties, the HRVEA used the Spatial Join extension in the ESRI ArcGIS® software and refined historic property parcel boundaries to determine which historic properties, identified in files searches and previous historic properties surveys, overlaid with the modeled Project viewshed (EDR 2022a, 2022b). The results of this exercise were then manually reviewed to confirm the location of each resource in areas of potential visibility (EDR 2021). This process was then repeated to determine which resources had visibility of RWF aircraft warning lights and the OSS. Finally, redundant resource points were eliminated, along with contributing resources (e.g., those not individually recorded as historic properties) which were located within historic districts (EDR 2022a).

In this Finding, consistent with the HRVEA, "historic districts within the [APE] were counted as a single property regardless of the number of contributing properties located within the [APE] in each district, as it was considered a conservative approach to address potential impacts to the entirety of the district rather than just select properties. Available documentation for NHL and NRHP-listed districts did not always indicate the total number of contributing properties, or which properties are considered to be contributing to the significance of a given district" (EDR 2022a:19). This means that effects to historic districts and the contributing properties within them were considered as a whole, inclusive of those portions of the district that may extend beyond the APE.

> Potential impacts to above-ground historic properties within the [visual]APE which have individual designations apart from the historic districts in which they are located were evaluated on an individual basis. Potential impacts to historic districts within the [visual] APE were considered to the entirety of the district as one property, rather than to each of the contributing properties, as not all contributing properties within historic districts are located in the [visual]APE. This approach is considered to be conservative as far as addressing potential impacts to historic districts as a whole. (EDR 2022a:18)

As the HRVEA notes, the primary "potential effect resulting from the introduction of wind turbines into the visual setting for any historic or architecturally significant property is dependent on a number of factors, including distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view (such as buildings/residences, overhead electrical transmission lines, cellular towers, billboards, highways, and silos)" (EDR 2022a:102).

> Potential visual effects were assessed by considering a number of factors for each above-ground historic property, including:
>
> - Maritime setting
> - Contribution of views of the sea to the above-ground historic property's significance
> - The location and orientation of the above-ground historic property relative to the shoreline/sea
>
> EDR reviewed the characteristics contributing to historic significance for each of the identified above-ground historic properties that have been determined as part of NRHP resource documentation, or state-level NRHP eligibility determinations (where such documentation was available) to determine whether or not the property had a significant maritime setting. . . . For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. . . .
>
> Significant views to the sea were assessed by desktop review of online mapping systems as well as field observation to determine whether the above-ground historic property has clear, unobstructed views of the sea and whether or not this view contributes to the historic significance of a given property. The distance and direction of view related to the intended historic purpose of above-ground historic properties with maritime setting was also given consideration in this assessment. . . .
>
> Eight distinct and empirical points of measurement were also considered in the assessment of the Project's potential visual effect on above-ground historic properties within the [visual]APE. These points of measurement were determined using the viewshed analysis generated through ArcGIS as described [above], and are further defined in the [visual impact assessment] VIA (EDR [2021c]). They include the following:
>
> - Distance from the nearest visible turbine
> - Blade tip visibility
> - Turbine Aviation light visibility
> - Mid-tower aviation light visibility
> - Coast Guard light visibility
> - Total acreage of above-ground historic property

- Total acreage of visibility within the above-ground historic property
- The portion of the above-ground historic property (percent of acreage) from which the Project would be potentially visible

> . . . While all the resources within the [visual]APE have theoretical views of the wind turbines, due to the effect of distance as well as the Earth's curvature on visibility, not all of the resources would have views of full turbines (i.e., in which the entire turbine structure was visible). In order to provide the most conservative level of analysis of potential Project visibility, the number of turbines for which turbine blade tips were visible was used in determining the number of turbines visible from a given above-ground historic property.
>
> Upon a manual review of the viewshed results, it was found that in some cases the amount of potential visibility which was found to intersect . . . historic property boundaries was relatively small, in some cases single "cells" or "pixels" and would not represent any noticeable amount of actual visibility. Single cells of visibility produced in the viewshed analysis represent 0.00222-acre, or approximately 96 square feet (8.9 sq. m) of space and may be considered erroneous or otherwise not representative of actual visibility. Therefore, although the viewshed analysis indicated that these small portions of the [APE] occur within the boundaries of an historic property, these historic properties with only one "cell" of visibility were not considered to have actual views of the Project.
>
> In addition, [many] above-ground historic properties within the [visual]APE have large boundaries (i.e., over 10 acres), so that even a small percentage of the viewshed within such a property's acreage could be relatively large. For example, the Kay St.-Catherine St.-Old Beach Road Historic District (73000052) occupies 303 acres in the City of Newport. The viewshed analysis indicated that four percent of this property had potential views of the RWF. In this case, four percent of the property is approximately 13 acres, which is still a relatively large area of visibility.
>
> Therefore, this quantitative assessment was intended to provide a baseline level of effects which was then supplemented with a qualitative assessment of the contribution of a property's maritime setting to its historic significance, the level of Project visibility, relationship of specific views towards the Project to the location, design, and historic use of an above-ground historic properties, and the overall sensitivity of each above-ground historic properties to visual effects. (EDR 2022a:102–106)

Because relevant "maritime settings vary considerably among the different types of historic properties" in the visual APE, the HRVEA grouped the historic properties where Project effects would result by resource type and discusses thematically (EDR 2022a:102). The HRVEA found the identified historic properties to be broadly categorizable as follows:

- Native American Sites, Historic Districts, and TCPs;
- Historic Buildings and Structures;

- Lighthouses and Navigational Aids;
- Recreational Properties;
- Historic Cemeteries and Burial Grounds;
- Maritime Safety and Defense Facilities;
- Agricultural Properties;
- Estates/Estate Complexes; and
- Historic Battlefields.

Above ground historic properties within each of these categories tend to be eligible for NRHP listing because of their contributions to important events in history under Criterion A and/or their embodiment of a significant architectural or engineering design, style, or masterful work under Criterion C. TCPs may additionally be eligible under NRHP Criteria B and D for their connections to important people in the heritage of [redacted] and the important information they can provide regarding [redacted] history, respectively. Some of the historic properties also were found to meet several of the NRHP Criteria Considerations, before being found eligible for NRHP listing under Criteria A, C, or D (EDR 2022a). Additionally, NHLs identified under any category are recognized to "possess exceptional value as commemorating or illustrating the history of the United States" that requires “a higher standard of care when considering undertakings that may directly and adversely affect NHLs” (NPS 2021).

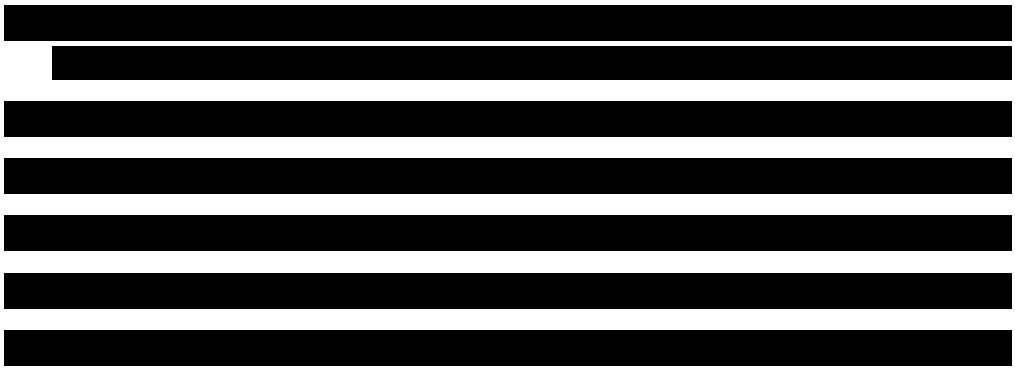
4.1.3.1 Native American Sites, Buildings, Districts, and Traditional Cultural Properties

Six TCPs are identified in the visual APE by the HRVEA (Appendix B). These include three recorded as historic resources in RI: [redacted]. The three resources in MA were originally documented specifically due to their identification [redacted] as TCPs: [redacted], all of which are represented by broad, complex cultural landscapes and connected seascapes (EDR 2022a).

Of the six TCPs in the visual APE, BOEM has determined that the Project would result in visual adverse effects to the [redacted] TCP and the [redacted] TCP due to the proximity of the RWF and due to the importance of the TCPs’ views toward the water, where the visual character of the adjoining landscape and seascape contribute to TCP significance.

The common attributes of this historic property type with respect to visual setting are described by EDR (2022a:42–43) as follows:

[redacted]



4.1.3.2 Historic Buildings and Structures

There are 251 historic buildings and structures identified in the offshore visual APE (Appendix B). Historic properties of this type "consist mostly of vernacular residences or groupings of residences, with some limited variety of building types within the districts, in addition to historic markers and public parks" (EDR 2022a:102). The variety of buildings and structures associated with this type extends to neighborhood commercial districts and buildings (including industrial sites) and includes supporting infrastructure, such as area bridges, that—in composite—makeup these settlement areas and supported the livelihoods of the local residents. In other cases, the use of the historic residence has changed to commercial, municipal, institutional, educational, religious, transportation or to other non-residential repurposing (EDR 2022a).

Of the 251 historic properties of this type in the visual APE, RI contains 86, MA 163, and CT two (EDR 2022a). Of these historic buildings and structures, 48 in RI and MA possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Aquinnah, MA
Vanderhoop, Edwin DeVries Homestead
Tom Cooper House
Theodore Haskins House
Gay Head – Aquinnah Town Center HD
3 Windy Hill Drive
71 Moshup Trail
Leonard Vanderhoop House
Gay Head-Aquinnah Coast Guard Station Barracks

Chilmark, MA
Hancock, Capt. Samuel-Mitchell, Capt. West House
Russell Hancock House
Simon Mayhew House
Flaghole
Flanders, Ernest House, Shop and Barn

Dartmouth, MA
Salters Point

Fairhaven, MA
744 Sconticut Neck Road

West Tisbury, MA
Scrubby Neck Schoolhouse

Westport, MA
Westport Point Historic Districts (1of 2)
Westport Point Historic Districts (2 of 2)
Westport Harbor
Gooseneck Causeway

Little Compton, RI
Warren Point Historic District

City of Newport, RI
Kay St.-Catherine St.-Old Beach Rd. HD/The Hill

South Kingstown, RI
Brownings Beach Historic District

New Shoreham, RI
Spring Street
Corn Neck Road
Hippocampus/Boy's Camp/Beane Family
Mitchell Farm
Beach Avenue
Peleg Champlin House
Indian Head Neck Road
U.S. Weather Bureau Station
Old Town and Center Roads
Old Harbor Historic District
New Shoreham Historic District
Beacon Hill Road
Capt. Welcome Dodge Sr.
Caleb W. Dodge Jr. House
Lakeside Drive and Mitchell Lane
Pilot Hill Road and Seaweed Lane
Mohegan Cottage/Everett D. Barlow House
Capt. Mark L. Potter House

Middletown, RI
Indian Avenue Historic District
Paradise Rocks Historic District
St. Georges School
Land Trust Cottages
Sea View Villa
Whetstone

Tiverton, RI
Puncatest Neck Historic District

The HRVEA describes the common attributes of this historic property categorization with respect to the visual setting of the historic properties as follows:

> These above-ground historic property types often are adjacent to and offer clear views of the ocean or are significant due to their development as residential communities. For many above-ground historic properties of this type, a relationship with the Atlantic Ocean is essential to their historic integrity. . . . Historic Buildings and Structures are important elements of cultural heritage within the [APE], within the majority of examples found along or near the shoreline . . . . While no official documentation relative to the maritime significance of this specific above-ground historic property type is known, several common features are mentioned across the breadth of the individual nomination forms that may be considered as the common attributes with respect to their visual setting:
>
> - Historic maritime (fishing and shipping) economy;
> - Location along or near the water;
> - Views and vistas of the Atlantic Ocean;
> - Vernacular design and locally sourced materials;
> - Landscape design derived from the natural environment; and
> - Local historic associations. (EDR 2022a:44)
>
> Historic buildings and structures . . . occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local

> roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting. . . . Historic seaside villages, ports and other districts in the study area are commonly characterized by dense development and narrow roadways. The maritime setting for such districts is often obvious and may be expressed through the design and orientation of homes, commercial properties and other buildings, parks, docks, piers, and breakwaters. Depending on the specific characteristics of each district, open ocean views may or may not be available from the majority of historic buildings and other areas within a village. Further, marine viewsheds may encompass limited areas due to the complexity of the shoreline and presence of points, necks, or islands that screen views towards the open ocean. Where ocean versus bay views are available but are tangential to the dominant aspects of maritime viewsheds, changes to those distant ocean views may not diminish the integrity of a seaside village or other historic district. Where ocean views are a dominant aspect of the maritime setting, changes to such viewsheds may diminish the integrity of a historic district, even where views are limited to immediate shoreline sections. (EDR 2022a:96–97)

4.1.3.3 Lighthouses and Navigational Aids

There are 20 lighthouses and navigational aids identified in the visual APE (Appendix B). This historic property type, lighthouses in particular, "may be broadly defined as water-related navigation aids to transportation and defense consisting of a light tower, featuring prominent views of the sea, and dominance of the surrounding landscape generally shared among all the individual properties" (EDR 2022a:44).

Of the 20 historic properties of this type in the visual APE, MA contains 10, RI nine, and NY one (EDR 2022a). Of these lighthouses and navigational aids, 10 in RI and MA possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Aquinnah, MA
Gay Head Light

Falmouth, MA
Nobska Point Lighthouse

Gosnold, MA
Tarpaulin Cove Light

New Bedford, MA
Butler Flats Light Station
Clark's Point Light

Jamestown, RI
Beavertail Light

Little Compton, RI
Sakonnet Light Station

Narragansett, RI
Point Judith Lighthouse

New Shoreham, RI
Block Island North Lighthouse
Block Island Southeast Lighthouse NHL

The common attributes of this historic property type with respect to visual setting are described by EDR (2022a:47) as follows:

- Direct physical location and/or historic functional relationship with the sea;
- Elevated and prominent views of the sea;
- Visual prominence of the surrounding landscape;
- Isolation or at least spatial dominance of the surrounding landscape; and
- Proximal relationship to shipping lanes.

> Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid. (EDR 2022a:95)

4.1.3.3.1 Block Island Southeast Lighthouse National Historic Landmark

Among the identified lighthouses and navigational aids, the Block Island Southeast Lighthouse (Figure 1) has been recognized for its importance to U.S. history as an NHL. The HRVEA describes the property as follows.



Figure 1. Block Island Southeast Lighthouse before it was offset from the bluff edge (Stupich 1988).

> This property is located approximately 12 miles (19.3 km) south of the coast of mainland Rhode Island, on Mohegan Bluff, on the southeast shore of Block Island, approximately 14 miles (22.5 km) from the nearest [Project] turbine. . . . Built in 1874 and fully operational by 1875, [Southeast] Lighthouse consists of a five-story brick tower and a two-and-a-half-story, brick duplex keeper's residence. The duplex residence is connected to a one-and-a half-story kitchen by a hyphen of the same height. It is a rare surviving example of a lighthouse built during a brief period of Victorian Gothic design influence at the U.S. Lighthouse Board and the sole surviving lighthouse of its high-style design. In 1993, the lighthouse structure and dwelling were moved approximately 250 feet (76.2 m) back from the edge of the bluffs to prevent the loss of the above-ground historic property to erosion. The light tower and dwelling were moved as a single mass, including the above-ground elements of the foundations, to retain the historic fabric. The new location preserves the historic relationship of the lighthouse with seacoast … Block Island Southeast Lighthouse was designated an NHL in 1995. (EDR 2022a:46)

Block Island Southeast Lighthouse NHL is listed on the NRHP under Criterion A, for its national importance in the history of maritime transportation, and under Criterion C for the national significance of its architecture and technology (SWCA 2021b). The maritime setting of the NHL is a key aspect of historic integrity cited in the NHL nomination. The HRVEA found Block Island Southeast Lighthouse NHL in particular to have high visual sensitivity within the visual APE, due to its historic location, setting, and feeling being primarily associated with clear views of the sea and for which public use enhances appreciation of the property's historic use and association with the sea (EDR 2022a). Approximately 48% (6 acres) of this approximately 134-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2022a:Attachement A). The visual simulations for Block Island Southeast Lighthouse NHL are those at KOP BI-04 (day and night) in Appendix C.

Prudent and feasible alternatives to avoid adverse effects from the Project on this and other NHLs, and planning to the maximum extent possible necessary to minimize harm to NHLs, are presented in Section 5 of this Finding.

4.1.3.4 Historic Cemeteries and Burial Grounds

There are 36 historic cemeteries and burial grounds included in the visual APE (Appendix B), consisting of "cemeteries identified by federal, state, or local governmental agencies as having historic significance" (EDR 2022a:47). Of the 36 historic properties of this type in the visual APE, RI contains 23 and MA 13 (EDR 2022a). RI has specific mandates for documenting historic cemeteries.

Of these, one in RI possesses important settings and critical views of the Project (see EDR 2022a:Attachment A) and has been determined by BOEM to be subject to adverse effects from the offshore elements of the Project: Island Cemetery/Old Burial Ground in New Shoreham, on Block Island. The Island Cemetery/Old Burial Ground would be adversely affected by the Project because of the characteristically elevated ocean views that are maintained for this memorial resting place and the historically maritime populous that it serves. Otherwise, the secluded nature of properties of this type and their rare occurrence near the shoreline greatly limits visibility, and therefore effects, of the Project.

The common attributes of this historic property type with respect to their visual setting are described as follows:

> These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development. . . . Typically, cemeteries and burial grounds are not eligible for listing in the NRHP except when they satisfy NPS Criteria Consideration D: 'd. A cemetery which derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events'. . . . [Attributes include:]
>
> - Secluded or private setting;
> - Designed landscape features;
> - Graves of persons of local, state, or national significance; and
> - Examples of funerary art and/or architecture (i.e., a mausoleum or above-ground crypt). (EDR 2022a:47–48)
>
> Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. . . . Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views. (EDR 2022a:96)

4.1.3.5 Maritime Safety and Defense Facilities

There are 31 maritime safety and defense facilities included in the offshore visual APE (Appendix B), plus one within the onshore visual APE (EDR 2021a). This property type consists of "facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense" (EDR 2022a:48). Although, "These structures vary in their design and construction materials," they "are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense" (EDR 2022a:48).

Of the 31 historic properties of this type in the visual APE, RI contains 20, MA nine, and NY two (EDR 2022a). Of these, 10 in RI and MA possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

New Bedford, MA
Fort Rodman Historic District
Fort Taber Historic District

Westport, MA
Horseneck Point Lifesaving Station
Gooseberry Neck Observation Towers

Narragansett, RI
Life Saving Station at Narragansett Pier
Fort Varnum/Camp Varnum

New Shoreham, RI
U.S. Coast Guard Brick House
U.S. Lifesaving Station
WWII Lookout Tower – Spring Street
WWII Lookout Tower at Sands Pond

The common attributes of this historic property type with respect to their visual setting are described in the HRVEA as follows:

> The Maritime Safety and Defense Facilities within the [APE] have served to protect and act as rescue stations for the coastal waters of Rhode Island and Massachusetts. These above-ground historic properties were constructed as government buildings that needed open views and access to the ocean to fulfill their functional roles and are therefore located immediately adjacent to the coastline to facilitate direct interaction with the water. For all aboveground historic properties of this type, a physical relationship to the Atlantic Ocean is essential to historic integrity. . . . [Attributes include:]
>
> - Construction commissioned by the federal government for use by a bureau of the Department of Defense;
> - Built for interaction between the structure and ocean-going vessels;
> - Location along or near the water;
> - Clear views of the ocean, and/or direct access to the water; and
> - Design includes living quarters and functional space. (EDR 2022a:49)
>
> Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of known hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequently located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made. (EDR 2022a:96)

4.1.3.6 Agricultural Properties

There are 48 agricultural properties included in the visual APE (Appendix B). This property type consists of "historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose" (EDR 2022a:49).

Of the 48 historic properties of this type in the visual APE, MA contains 33 and RI 15 (EDR 2022a). Of these agricultural properties, four in RI possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Little Compton, RI
Tunipus Goosewing Farm

Middletown, RI
Bailey Farm

New Shoreham, RI
Champlin Farm
Lewis-Dickens Farm

Although, "Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities" (EDR 2022a:49), the HRVEA addresses the four cases where adverse effects would result based on the open or maritime island settings of these particular historic properties. The common attributes of this historic property type with respect to their visual setting are described in the HRVEA (EDR 2022a:50) as follows:

- Farmhouses;
- Barns and associated ancillary buildings;
- Large, open fields;
- Fieldstone walls dividing property or grazing space; and
- Locally sourced building materials.

> Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island. (EDR 2022a:95)

4.1.3.7 Recreational Properties

There are 27 recreational properties included in the visual APE (Appendix B). This property type is "defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish" (EDR 2022a:50).

Of the 27 historic properties of this type in the visual APE, RI contains 20, MA five, and NY two (EDR 2022a). Of these recreational properties, 14 in RI and MA possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from the offshore elements of the Project:

Aquinnah, MA
Gay Head - Aquinnah Shops Area

Westport, MA
Clam Shack Restaurant

Narragansett, RI
The Towers Historic District
The Towers/Tower Entrance-Narragansett Casino
Ocean Road Historic District
Dunes Club
Narragansett Pier MRA

Middletown, RI
Clambake Club of Newport

New Shoreham, RI
Hygeia House
Nathan Mott Park
Spring House Hotel
Spring Cottage
Miss Abby E. Vaill/1 of 2 Vaill cottages
Hon. Julius Deming Perkins/"Bayberry Lodge"

The common attributes of this historic property type with respect to their visual setting are described by HRVEA as follows:

> These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities. . . . [Attributes include:]
>
> - Functionality designed for human interaction;
> - Location along or near the water;
> - Views and vistas of the Atlantic Ocean;
> - Landscaped lawns and gardens; and
> - Ancillary buildings, such as garages, caretaker cottages, or sheds. (EDR 2022a:50–51)
>
> Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the

> open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment. (EDER 2022a:95)

4.1.3.8 Estates and Estate Complexes

There are 28 estates and estate complexes included in the visual APE (Appendix B). This property type "consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries" (EDR 2022a:51).

Of the 28 historic properties of this type in the visual APE, RI contains 21 and MA seven (EDR 2022a). Of these, 11 in RI possess important settings and critical views of the Project (see EDR 2022a:Attachment A) and have been determined by BOEM to be subject to adverse effects from offshore Project elements:

Jamestown, RI
Horsehead/Marbella

Little Compton, RI
Stone House Inn
Abbott Phillips House

Middletown, RI
The Bluff/John Bancroft Estate

Narragansett, RI
Dunmere

City of Newport, RI
Ocean Drive Historic District NHL
Bellevue Avenue Historic District NHL
The Breakers NHL
Marble House NHL
Ochre Point – Cliffs Historic District
Rosecliff/Oelrichs (Hermann) House/Monroe (J. Edgar) House

The common attributes of this historic property type with respect to their visual setting are described by the HRVEA as follows:

> Estates and Estate Complexes within the [visual]APE transcend the traditional residential above-ground historic property type in their grandeur and scale. These above-ground historic property types often are set upon open tracts of naturalistic or stylized

designed landscapes and are often accompanied by a variety of ancillary buildings. For many above-ground historic properties of this type, views of the Atlantic Ocean are essential to their historic integrity. . . . Estates and Estate Complexes are well-known as one of the symbols of cultural heritage in Rhode Island, and the City of Newport in particular. . . . [Attributes include:]

- Location along or near the water;
- Views and vistas of the Atlantic Ocean;
- Long driveways meant to offer views of the main house on approach;
- Landscaped lawns and gardens; and
- Ancillary buildings, such as garages, caretaker cottages, or sheds. (EDR 2022a:52)

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed. (EDR 2022a:95–96)

4.1.3.8.1 Ocean Drive Historic District National Historic Landmark

The Ocean Drive Historic District (Figure 2) is one of four of the identified estates and estate complexes recognized for its importance to U.S. history as an NHL. The HRVEA describes this NHL as follows.

> The summer homes in the Ocean Drive Historic District feature great variety in style and opulence, ranging from Neoclassical-style mansions to early nineteenth-century farms. In contrast to the adjacent Bellevue Avenue Historic District, however, Ocean Drive (aka Ocean Avenue) is decidedly more bucolic and rural, with greater expanses between structures accentuated by natural and designed landscapes. The national significance of the Ocean Drive Historic District is derived from its architecture, which includes works from McKim, Mead and White, John Russell Pope, and landscape architecture by Frederick Law Olmstead [*sic*] . . . In 2012 an updated statement of significance was appended to the NHL nomination which elaborated and expanded upon the initial areas of Criterion C significance such as architecture and landscape design. The update also addressed additional Criterion A areas of significance such as planning, and engineering related to maritime views and design features purposefully built to interact with the shoreline and the ocean. The updated nomination materials also included a detailed account of the evolution of Ocean Drive as a "pleasure drive" to accompany the development of the inland areas as an upper-income resort suburb. (EDR 2022a:140)

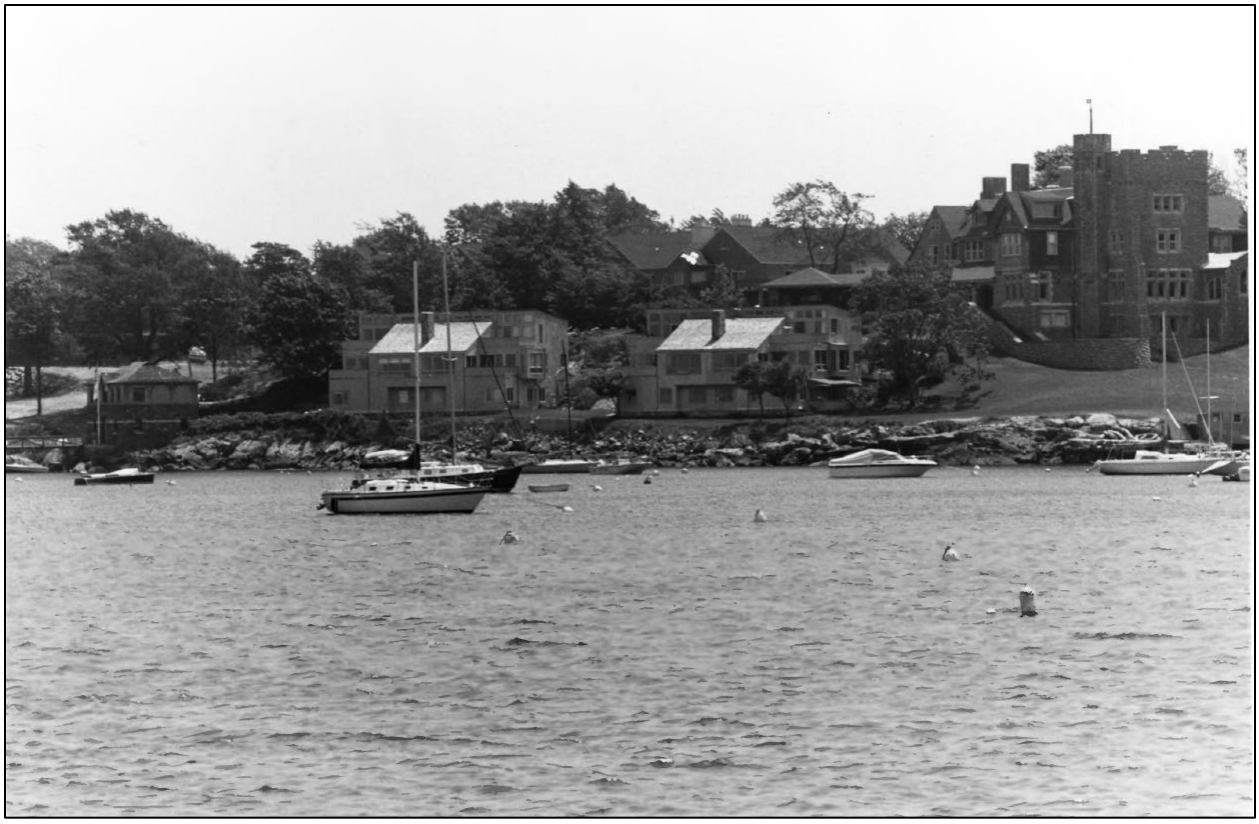


Figure 2. Ocean Drive Historic District photographed from the sea (NRHP 1976).

> [Olmsted's] landscape architecture firm . . . was involved in at least two subdivisions and 15 private contract designs within the district. These designs include properties situated on dramatic overlooks, and along Ocean Drive. Clearly this roadway was specifically constructed to take advantage of ocean views. (EDR 2022a:140)

The Ocean Drive Historic District NHL was made up of 45 contributing properties located in an over-1,500-acre district in a suburban/rural setting encompassing most of the peninsula southwest of the City of Newport (SWCA 2021b). The NRHP nomination finds the district eligible under Criteria A and C in the areas of architecture, landscape architecture, community planning, conservation, and environmental preservation (SWCA 2021b). The NHL program focuses on the district architecture and landscape, providing the following statement of national significance, "This large historic district… has a rugged, informal character, as compared with the formal aspect of the Bellevue Historic District. It includes early farms and elaborate summer homes, as well as landscapes designed by Olmsteds' firm to accord with the natural contours of rocky cliffs, green hills and pastures. The area was favored by 19th-century industrial magnates and the social elite" (NPS 2012). The Ocean Drive Historic District NHL and its contributing buildings tend to retain integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). Approximately 15% (261 acres) of this approximately 1,756-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2022a:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the shorelines and NHLs at Newport, RI.

Prudent and feasible alternatives to avoid adverse effects from the Project on this and other NHLs, and planning to the maximum extent possible necessary to minimize harm to NHLs, are presented in Section 5 of this Finding.

4.1.3.8.2 Bellevue Avenue Historic District National Historic Landmark

The Bellevue Avenue Historic District (Figure 3) is one of four of the identified estates and estate complexes recognized for its importance to U.S. history as an NHL. The HRVEA describes this historic property as follows.



Figure 3. Chateau-sur-mer in the Bellevue Avenue Historic District (Boucher 1969; NRHP 1972).

> Newport is one of the most spectacular assemblages of American architecture from its beginning to our own time. There are structures in this district that could never be built again in such close proximity, nor possessing such variety, nor by a group of such distinguished architectural firms. This district begins with several commercial blocks including the Casino, continues with the Gothic Revival villas, and includes the "Stick Style" and Shingle Style and culminates in the great 19th century summer palaces of Bellevue Avenue and Ochre Point. The list of architects embraces almost every major designer of that time and what emerges at Newport is also a study of the development of the taste and skill of men like Richard Upjohn, Richard Morris Hunt and McKim, Mead and White over their professional careers.

> The Bellevue Avenue Historic District National Historic Landmark is approximately two miles long and consists of 87 contributing properties . . . occupying several blocks along Bellevue Avenue, from Memorial Boulevard in the north, to Block Island Sound in the south, in the City of Newport. Spring Street and Cogshell Avenue form the western boundary of the district, while Narragansett Bay forms the eastern boundary. From north to south, this district features two miles of commercial blocks and villas, notably ending in the south with the grand and palatial nineteenth-century estates of wealthy summer residents. (EDR 2022a:A-25)

The district possesses many distinctive examples of high-style architecture. While the significance attributed in the NRHP-nomination of the district does not explicitly reference the ocean, the views of the ocean were essential to the planning and construction of the contributing buildings (SWCA 2021b). The district contains contributing buildings that are also individually recognized has NHLs, specifically The Breakers NHL and Marble House NHL. The NRHP nomination finds the district significant in the areas of architecture, landscape architecture, and commerce (SWCA 2021b). The significance focuses on aspects of the district that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of commerce further provides for the NRHP-eligibility of the district under Criterion A for its relation to important events in the historic development of Newport (SWCA 2021b). The NHL program more fully focuses on the district architecture, providing the following statement of national significance, "An assemblage of American architecture distinguished by the variety of styles and famous architectural firms represented, the district includes Gothic Revival villas, Stick- and Shingle-style buildings, and great summer palaces of the late 19th century" (NPS 2015a). The Bellevue Avenue Historic District NHL and its contributing buildings tend to retain integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 13% (over 70 acres) of this approximately 600-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2022a:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores.

4.1.3.8.3 The Breakers National Historic Landmark

The Breakers (Figure 4) is an estate/estate complex recognized for its importance to U.S. history as an NHL and located in the Bellevue Avenue Historic District NHL. The HRVEA describes this historic property as follows:

> The Breakers . . . is located on at Ochre Point Avenue in Newport, Rhode Island, approximately 16 miles (25.7 km) from the nearest [Project] turbine. . . . The estate was designed by Richard Morris Hunt and built between 1893 and 1895 for Cornelius Vanderbilt II. It emulates a sixteenth-century, northern Italian palazzo. Elaborate façade work and imposing mass are featured in the architecture and speak to the substantial power and wealth of the original residents. The estate is significant for its historic associations with America's first architect trained at the Ecole Des Beaux-Arts, Richard Morris Hunt, and for being the largest and perhaps most famous Newport estate built by wealthy patrons at the turn of the twentieth century. . . . The Breakers was individually listed in the NRHP in 1971. . . . and designated an NHL in 1994. (EDR 2022a:52)



Figure 4. The Breakers in the Bellevue Avenue Historic District (NRHP 1971a).

The NRHP nomination finds The Breakers significant in the areas of architecture, social history, and transportation (SWCA 2021b). The significance focuses on aspects of the historic property that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of social history and transportation further provides for the NRHP-eligibility of the historic property under Criterion A for its relation to important events associated with high society in the historic development of Newport and the social position and wealth of the Vanderbilts arriving from the railroad industry. The NHL nomination further indicates eligibility of The Breakers under NRHP Criterion B for significant association with Cornelius Vanderbilt II and Richard Morris Hunt (SWCA 2021b). The NHL program focuses on architecture, providing the following statement of national significance, "The Breakers is the architectural and social archetype of the Gilded Age, a period when members of the Vanderbilt family were the merchant princes of American life through their prominence in the world of finance, as patrons of the arts, and as vanguards of international society. In 1895, the year of its completion, The Breakers was the largest, most opulent house in a summer resort considered the social capital of America. It was built for Cornelius Vanderbilt II (1843-1899), a key figure in American railroads, philanthropy, and fashionable society, and designed by Richard Morris Hunt (1827-1895), one of the founding fathers of architecture in America" (NPS 2006). The Breakers NHL retains integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 29% (5 acres) of this approximately 16-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2022a:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores.

4.1.3.8.4 Marble House National Historic Landmark

Marble House (Figure 5) is an estate/estate complex recognized for its importance to U.S. history as an NHL and is also located in the Bellevue Avenue Historic District NHL. Marble House is describable as follows.



Figure 5. Marble House in the Bellevue Avenue Historic District (NRHP 1971b).

> Marble House (71000025) is a three-story Neoclassical mansion located on Bellevue Avenue in Newport. It was commissioned by William Vanderbilt, designed by famed architect Richard Morris Hunt and constructed 1892. Built with an imposing architectural scale and clad in Tuckahoe white marble, it is one of the stateliest mansions contributing to the NHL-listed Bellevue Avenue Historic District. The property was individually listed on the NRHP before the district was nominated. (SWCA 2021b:30)

The NRHP nomination finds the Marble House significant in the areas of architecture and social history (SWCA 2021b). The significance focuses on aspects of the historic property that make it NRHP-eligible under Criterion C, for the embodiment of distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and possess high artistic values. Significance in the area of social history further provides for the NRHP-eligibility of the historic property under Criterion A for its relation to important events in the historic development of Newport. The NHL nomination additionally finds Marble House eligible under NRHP Criterion B for its significant associations with Alva Belmont

and William K. Vanderbilt (SWCA 2021b). The NHL program focuses on architecture, providing the following statement of national significance, "Inspired by the Petit Trianon (1760-1764) a garden retreat on the grounds of Versailles, the house's French inspired interiors were designed by Jules Allard and Sons, of Paris. A virtual showcase of various French styles and built with seemingly endless financial resources, the house was unparalleled in design and opulence in its day. The economic influence of the Vanderbilts and their financial and cultural power in America were expressed in the family houses and their patronage of American architecture. As one of the earliest of the Beaux Arts houses to appear in America, it would influence the design of architecture thereafter. Today, Marble House is a testament to the architectural genius of Richard Morris Hunt and the spirit of America's 'Gilded Age.'" (NPS 2015b). The Marble House NHL retains integrity of location, design, materials, workmanship, association, feeling, and setting (SWCA 2021b). About 5% (one-third acre) of this approximately 6-acre historic property are within the visual APE and would have visibility of Project WTGs and OSS (EDR 2022a:Attachement A). The visual simulations from Newport Cliff Walk at KOP AI-03 in Appendix C best represent the views from the NHLs on Newport shores.

4.1.3.9 Historic Battlefields

There are four historic battlefields included in the visual APE, which "consist of typically large landscapes across which the events of historic military actions took place" and, within these, "any number of more focused and specific points of significance may exist, while the collective significance of the events of the battle is broader" (EDR 2022a:52).

Of the four historic properties of this type in the visual APE, MA contains three and RI one (EDR 2022a). Of these, one historic battlefield in MA, the Westport Point Revolutionary War Properties, would be subject to adverse effects from the Project.

The common attributes of this historic property type with respect to their visual setting are described by the HRVEA as follows:

> These types of above-ground historic properties are typically spread out over large areas, sometimes encompassing entire town centers or portions of townships. They may include landscapes, buildings, or water features which were integral to the outcome of the struggles which took place in their midst. In some cases, these features have been significantly altered from the time of the battles. . . .
>
> [R]egarding the visual setting of battlefields with regard to their significance, as in most cases the significance of an historic battlefield lay in their historic context and the physical struggles that took place on them. However, there are some characteristics which may be generally common to Historic Battlefields:
>
> - Natural features which influenced military operations;
> - Military engineering works (trenches, forts);
> - Sites of engagement; and
> - Corridors of movement. (EDR 2022a:53–54)

> Properties of this type are mostly inland and will only have visibility in isolated areas within their boundaries, or in the small areas where their boundaries touch the shoreline. The potential effects of the Project are further mitigated because the significance and setting of these properties are characterized by terrestrial conflict, and not from pristine views of the seascape or relationship to the ocean. (EDR 2022a:109)

4.1.3.10 Summary of the Assessment of Adverse Effects and Cumulative Effects to Historic Properties in the Visual Area of Potential Effects

The 101 adversely affected historic properties within the visual APE for onshore and offshore development retain their maritime setting, and that maritime setting contributes to the property's NRHP eligibility and continues to offer significant seaward views. These seaward views support the integrity of the maritime setting and include vantage points with the potential for an open view from each property toward RWF WTGs (EDR 2021b, 2022a). For historic properties where BOEM has determined the Project would cause adverse effects, BOEM then assessed whether those effects would be additive to the potential adverse effects of other reasonably foreseeable actions at the 101 historic properties, thereby resulting in cumulative effects (see SWCA 2022).

BOEM reviewed the HRVEA's list of historic properties assessed as likely to be adversely affected by the Project and all information and comments provided by consulting parties in correspondence and at meetings to date to inform determinations of adverse effects including visual and cumulative effects.

BOEM (2022a) has determined that options to reduce the number of RWF WTGs under any action alternative for the Project (see Table 1) would effectively minimize visual effects because there would be fewer WTGs constructed and visible from the affected historic properties (see also Section 5). However, none of the alternatives would completely avoid visual adverse effects for the 101 above ground historic properties.

The cumulative effects analysis quantified the total number of WTGs from all planned future developments theoretically visible (daytime or nighttime) within the APE (EDR 2021b). This analysis projected that the development of additional wind farms in the RI/MA WEA would result in the construction of nearly 1,000 WTGs (EDR 2021b, 2022a; SWCA 2022). The project would contribute proportionally from nearly 10% to nearly 90% of the cumulative adverse effect, owing to the location and intensity of the foreseeable build-out attributed to other offshore wind energy development activities. This is based on full buildout of the Project (up to 100 WTGs and two offshore substations [OSS]) and all other reasonably foreseeable offshore wind projects currently planned in the APE (modeled at 955 WTGs and three OSSs [EDR 2021b]). The proportion of visible WTG elements added by the project ranges from 9.6 percent at [redacted] TCP, where all modeled WTGs and OSS would potentially be visible, to 87.2 percent at the historic U.S. Weather Bureau Station at Block Island, where the Project WTGs would potentially be visible in greater numbers than the combination of all other future wind farms planned in adjacent OCS lease areas (41 Project WTGs would potentially be visible there versus six WTGs from other planned projects) (SWCA 2022). Intensity of visual impacts from WTG and OSS development would reduce with distance from historic properties and lighting and design actions that would be taken by Revolution Wind to minimize impacts; however, cumulative effects would not be fully eliminated at the 101 adversely affected historic properties.

BOEM has found that the Project would have adverse visual effects on the 101 historic properties listed in Table 3. Per the Criteria of Adverse Effect, the undertaking would introduce visual Project elements that diminish the integrity of these historic properties' significant historic features. BOEM did, however, determine that due to the distance and open viewshed, the integrity of the properties would not be so diminished as to disqualify any of them from NRHP eligibility.

Although the HRVEA identified 350 other above ground historic properties on mainland RI and MA within the visual APE of offshore Project components, BOEM has determined that either no effects or no adverse effects would result at these historic properties, based on the justifications provided in the HRVEA (see EDR 2022a:Attachment A). While their size and siting may afford many of these historic properties some view toward the Lease Area, for some these views will not be critical to their integrity and for others existing buildings, vegetation, and elements of the built environment result in limited, screened views. Existing buildings and infrastructure are also often accompanied by preexisting nighttime lighting that would reduce the visibility of farther off Project lighting. Visibility would be further minimized based on distance between onshore historic properties and offshore Project components. With increasing distances between historic properties and the RWF, atmospheric, environmental, and other obscuring factors, such as fog, haze, sea spray, wave height, and normal viewer acuity, serve to further minimize the visual intrusion posed by offshore WTGs. The ability of these 350 historic properties to convey the significance of their architectural and social history would be unaltered by the Project.

BOEM reviewed the assessment in the HRVEAs and CHRVEA and has determined that the Project would result in no adverse effects to any above ground historic properties identified in the visual APE beyond the 101 historic properties identified as adversely affected in Table 3.

5 Actions to Avoid, Minimize, or Mitigate Adverse Effects

As a requirement of COP approval, BOEM would stipulate the avoidance of historic properties identified in the APE and not currently found to be subject to adverse effects from the Project. This includes considering all prudent and feasible alternatives to avoid adverse effects on the NHLs, as discussed below.

For unavoidable adverse effects to historic properties, additional minimization and mitigation measures would be developed in consultation with the appropriate parties. This includes, to the maximum extent possible, taking such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking.

Avoidance, minimization, and mitigation measures would be implemented through execution of an MOA by BOEM and the required signatories to resolve adverse effects under Section 106. Simultaneous to the release of this Finding, BOEM is releasing its *Draft Memorandum of Agreement Among the Bureau of Ocean Energy Management, the State Historic Preservation Officers of Connecticut, Massachusetts, New York, and Rhode Island, and the Advisory Council on Historic Preservation Regarding the Revolution Wind Farm and Revolution Wind Export Cable Project* for consulting party review. The MOA would be finalized and its requirements set by BOEM under NHPA Section 106 as a condition of BOEM's signing the record of decision (ROD), completing the NEPA review. Avoidance, minimization, and mitigation measures for historic properties are drafted in both the MOA and the historic property treatment plans attached to it. Under the MOA, adverse effects from the Project to historic properties, including NHLs, would be avoided, minimized, or mitigated in accordance with the NHPA Section 106 regulations (36 CFR 800) and in compliance with Section 110(f). The MOA also includes post-review discovery plans for onshore and offshore cultural resources, should previously undiscovered or unimpacted historic properties be identified. The post-review discovery plans would be implemented to assess and resolve any inadvertent adverse effects to these historic properties. Any historic properties that are discovered post-review, if adversely affected, would be resolved through the Section 106 consultation process detailed in these post-review discovery plans and the MOA.

5.1 Alternatives Considered

BOEM used the NEPA review process to consider a range of feasible alternatives to the maximum-case scenario of the Project's Proposed Action. That maximum-scenario would result in construction, operation, maintenance, and conceptual decommissioning of up to 100 WTGs and two OSS at the RWF. Alternatives considered would reduce the number of proposed WTGs. Analyses have found that reductions in WTG numbers will help minimize the adverse effects on above ground historic properties in the visual APE and ASFLs in the marine APE. However, no alternative meeting the purpose and need of Project development in the Lease Area would fully avoid adverse effects to historic properties, including from visual impacts to NHLs.

5.1.1 National Historic Landmarks

As the NPS (2021) conveys, "Section 110(f) of the NHPA requires that Federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs. The law

requires that agencies, 'to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark.' In those cases when an agency's undertaking directly and adversely affects an NHL… the agency should consider all prudent and feasible alternatives to avoid an adverse effect on the NHL." The implementing regulations for Section 106 of the NHPA at 36 CFR 800.10 provide special requirements for protecting NHLs and complying with the NHPA Section 110(f).

BOEM has planned and is taking action to avoid adverse effects on NHLs in accordance with NHPA 110(f) and pursuant to The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act (NPS 2021). Under all Project alternatives (BOEM 2021c), BOEM would avoid adverse effects to seven of the 12 NHLs in the visual APE: the Montauk Point Lighthouse, Original U.S. Naval War College Historic District, Fort Adams Historic District, Battle of Rhode Island Historic District, Nantucket Historic District, New Bedford Historic District, and William Watts Sherman House. This avoidance of adverse effects would be accomplished by taking advantage of existing obscuration, consisting of intervening factors such as curvature of the Earth, and atmospheric and environmental factors like fog, haze, sea spray, and intervening buildings, vegetation, and topography, which are enhanced with increasing distances between WTGs and historic properties. In addition, BOEM reviewed other NHLs in the vicinity, including the steamship *Sabino* in CT and the Newport Historic District in RI and determined these to not be in the APE. The *Sabino* only travels within 35 miles of the Project on tours and the Newport Historic District NHL, once distinguished from other adjoining historic district boundaries in the City of Newport, was found to be across Newport Neck from the Project without open ocean views of the RWF (EDR 2022a, 2022b).

BOEM has determined that five NHLs in RI would be adversely affected by the Project: Southeast Lighthouse on Block Island and Ocean Drive Historic District, Bellevue Avenue Historic District, The Breakers, and Marble House at Newport. BOEM has notified the NPS (as delegate of the Secretary of the Interior) and the ACHP of this determination with distribution of this Finding. The ACPH and NPS have been active consulting parties on the Project since BOEM invited them to consult at the initiation of the NHPA Section 106 process on the Project on April 6 and April 29, 2021, respectively. BOEM is fulfilling its responsibilities to give a higher level of consideration to minimizing harm to NHLs, as required by NHPA Section 110(f), through implementation of the special requirements outlined at 36 CFR 800.10 (BOEM 2021a).

Given the location of the lease and number of WTGs proposed, constraints on the necessary generation capacity for the project to be feasible, and the distance of the Lease Area to the shorelines of Block Island and Newport, BOEM determined that all feasible alternatives, including all feasible WTG layouts, would result in adverse visual effects on these five NHLs. Because of all these factors, the only alternative that BOEM was able to identify that avoids any Project effects on these NHLs was the no-action alternative. In the draft EIS, BOEM (2022a) has identified alternatives that reduce the number of WTGs by from the maximum-case scenario of the Proposed Action. While the differences between alternatives may be variable, alternatives for reduction in WTG numbers would all reduce visual effects on the NHLs and other adversely affected historic properties due to the fact that fewer WTGs would be constructed and therefore visible from above ground historic properties or as likely to necessitate the physical disturbance of ASLFs on the seafloor.

When prudent and feasible alternatives "appear to require undue cost or to compromise the undertaking's goals and objectives, the agency must balance those goals and objectives with the intent of section 110(f)" (NPS 2021). In this balancing, the NPS suggests that agencies should consider "(1) the magnitude of the undertaking's harm to the historical, archaeological and cultural qualities of the NHL; (2) the public interest in the NHL and in the undertaking as proposed, and (3) the effect a mitigation action would have on meeting the goals and objectives of the undertaking" (NPS 2021). For the Project, the magnitude of the visual effects on the five NHLs is minimized by the distance between proposed offshore WTGs and the onshore NHLs and other factors (such as obscuring factors) limiting views between Project WTGs and the five NHLs. Moreover, while the undertaking would affect the historic setting of the NHLs, it would not affect other character-defining features or aspects of the NHL's historic integrity. The five NHLs, should the undertaking proceed, would still illustrate their regional and national significance, and continue to exemplify their national importance.

Through consultation, BOEM would refine minimization measures to the maximum extent feasible and further develop mitigation measures of adverse effects that remain at the five NHLs after the application of minimization efforts. BOEM would identify and finalize mitigation measures specific to each NHL with the consulting parties through development of the MOA. Mitigation measures for adverse effects to NHLs must be reasonable in cost and not be determined using inflexible criteria, as described by the NPS (2021). Mitigation of adverse effects to the five NHLs would meet the following requirements:

- reflect the heightened, national importance of the property and be appropriate in magnitude, extent, nature, and location of the adverse effect;
- focus on replacing lost historic resource values with outcomes that are in the public interest, such as through development of products that convey the important history of the property;
- comply with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings (NPS 2017).

5.1.2 Action Alternatives that Would Minimize the Adverse Effect of the Project

The Proposed Action (Alternative B) would construct, operate, maintain, and perceivably decommission up to 100 WTGs of 8 to 12 MW each and up to two OSS; whereas, Alternative C (Habitat Alternative) would include 64–65 WTGs, Alternative D (Transit Alternative) would include 78–93 WTGs, Alternative E (Viewshed Alternative) would include 64–81 WTGs, and Alternative F (Higher Capacity Turbine Alternative) would combine with any of the other action alternatives to use 14 MW WTGs within the PDE of the 12 MW WTGs to reduce the overall numbers down to as few as 56 WTGs (see Table 4).

5.1.2.1 Minimization of Visual Adverse Effect

Reduction in WTG numbers was analyzed in the draft EIS to have the following opportunities to reduce visual impacts to above ground historic properties, which would additionally minimize harm to NHLs. Compared to the maximum-case scenario under the Proposed Action, Alternatives C through F could decrease impacts to historic properties from visibility of offshore wind structures and from the construction and installation lighting on these structures because the number of constructed WTGs and their viewshed would be reduced in the following manners (see BOEM 2022a:Table 3.10-7).

WTG structure and lighting visibility would be reduced from up to 100 WTGs under the Proposed Action to:

- 64 or 65 WTGs (up to 35% to 36% less, respectively) under Alternative C.
- 78 to 93 WTGs (up to 7% to 22% less) under Alternative D. These visual impacts under Alternative D would remain greater than those of Alternative C. Alternative D3 would specifically remove the closest seven WTG locations to Block Island and have an increased advantage for reducing visual impacts on above ground historic properties on the shores of that island over other action alternatives, except Alternative E2, which would remove even more WTGs on the Block Island side of the RWF.
- 64 to 81 WTGs (up to 36% to 19% less) under Alternative E. The Alternative E1 configuration, in particular, would reduce the proximity of WTGs to Martha's Vineyard and toward mainland RI. Alternative E2 would remove the closest WTGs to Martha's Vineyard and be most advantageous for reducing WTG proximity to Block Island; however, it would not be as effective overall as Alternative E1 for reducing WTG proximity to onshore areas. Although the distance of WTGs from Martha's Vineyard would increase under Alternative E specifically compared to other alternatives, the total number of WTG impacts would remain greater than those of Alternative C and would reach the potential lower WTG numbers and impacts of Alternative D. Alternative E is primarily focused on setbacks of WTGs from Martha's Vineyard and would effectively increase distances of Project WTGs to historic properties there, especially under Alternative E1. This especially includes increased setbacks from historic properties important to Tribal Nations at Aquinnah, inclusive of the Edwin DeVries Vanderhoop Homestead, Gay Head Light, and Gay Head - Aquinnah Shops. Alternative E also further increases setbacks from Newport and Block Island, including the Breakers, Marble House, and the Ocean Drive Historic District, Bellevue Avenue Historic District, and Southeast Lighthouse NHLs. The Alternative E setbacks for RWF WTGs would increase the distances to historic properties at Aquinnah by between approximately 0.25 and 1 mile, at Newport and mainland RI by approximately 4 miles, and at Block Island variably beginning at less than 1 mile and extending to over 4 miles. Therefore, Alternative E would be more effective in reducing visual impacts from the nearest potential WTGs to historic properties at Martha's Vineyard, MA, and along RI shores compared to other action alternatives but would not eliminate visual impacts to all historic properties and would not result in fewer visible WTGs and offshore RWF lighting sources than Alternatives C or F.
- as few as 56 WTGs (up to 44% less than the maximum of 100 WTG under the Proposed Action) under Alternative F when combined with any of the action alternatives (C1, C2, or E1) intended to allow for the fulfillment of the existing three PPAs' generation requirement of at least 704 MW. These WTG impacts under Alternative F could potentially be reduced from those of the other action alternatives, where WTG numbers are comparatively less.

Although reduced, the layout modification and construction activities proposed under Alternatives C through F would still include the same historic properties adversely affected under the Proposed Action and the same potential for impacts to these historic properties. Portions of all RWF WTGs would potentially be visible from approximately most of the 101 historic properties adversely affected under the action alternatives. All action alternatives, regardless of planned WTG numbers, would have the WTG visibility reduced somewhat due to intervening land areas and with setback distance from the coastline. As described, those action alternatives with the fewest WTGs and the greatest distances of setback would

have the least degree of potential visual adverse effects on historic properties. Under Alternatives C through F, the construction and installation of offshore Project components with lighting would have adverse effects to historic properties, similar to those of the Proposed Action. O&M and decommissioning of offshore Project components with lighting would have effects to historic properties under Alternatives C through F, similar to those of the Proposed Action. Visual effects from offshore Project components' lighting would be removed upon completion of decommissioning.

To the potential 955 WTGs modeled in a maximum-case scenario for other future offshore wind activities (EDR 2021b), Alternatives C through F would add visual effects from offshore WTG structure visibility and lighting, including from navigational and aviation hazard lighting systems. The same 101 historic properties would continue to be adversely affected by offshore structure lighting visibility in the visual APE under Alternatives C through F as under the Proposed Action. The cumulative visual effects of offshore structures and lighting on historic properties in the visual APE associated with Alternatives C through F when combined with past, present, and reasonably foreseeable activities would be long term and adverse, until decommissioning of the Project. However, for Alternative E, the visual proximity for effects from offshore Project elements would specifically have increased setbacks from historic properties at Martha's Vineyard, MA, and the nearest shores of RI (including NHLs at Newport).

5.1.2.2 Minimization of Physical Effects to ASLF from Seafloor Disturbance

Alternatives C through F would involve the same types or numbers of submerged historic properties on the seafloor at the RWF and RWEC offshore development areas as under the Proposed Action. However, these alternatives could decrease the risk of disturbance and impacts to historic properties because the number of constructed WTGs could be reduced and associated cable trenching could also decrease, resulting in greater Project flexibility for avoiding these historic properties. Therefore, RWEC and RWF WTG and IAC construction, operation, maintenance, decommissioning, and associated vessel anchoring would result in less seafloor disturbance than is anticipated for the Proposed Action (see BOEM 2022a:Table 3.10-7).

Potential construction disturbance for WTG and OSS locations is expected to reduce from the maximum scenario of 734.4 acres of Alternative B to 475.2-482.4 acres under Alternative C, 576-684 acres under Alternative D, 475.2-597.6 acres under Alternative D, and as little as 417.6 acres under Alternative F (BOEM 2022a:Table E4-1). The IAC length and acreage of disturbance between WTG would reduce comparatively. Potential anchorage disturbance is expected to reduce from the 3,178 acres of Alternative B to 2,062-2,093 acres under Alternative C, 2,496-2,961 acres under Alternative D, 2,062 or 2,589 acres under Alternative D, and as little as 1,814 acres under Alternative F (BOEM 2022a:Table E4-1).

Compared to the Prosed Action, Alternative C would place WTG locations farther from seven of the 29 historic properties in the marine APE, specifically 2.8 to 3.0 miles farther from ASLF Target-28 and Target-27, respectively and 0.25 mile to 2.5 miles farther from shipwrecks/possible historic shipwreck Target-02, Target-08, Target-17, Target-18, and Target-19, in order of increasing distance. Distances to other submerged historic properties in the marine APE would not change under Alternative C.

Alternative D would decrease the risk of disturbance and impacts at one potential shipwreck (Target 04) because the nearest WTG would be sited approximately 3.5 miles more distant from that shipwreck. Impacts would remain the same as the Proposed Action, however, if Alternative D retains WTG

proximity to that shipwreck. As a result, Alternative D would not have the potential to reduce potential for adverse effects at submerged historic properties as much as Alternative C. Alternative D would also maintain similar configurations to the Proposed Action at the other 28 ASLFs and shipwrecks/possible historic shipwrecks in the marine APE.

Compared to the Proposed Action, the 64 WTG configuration of Alternative E1 would place WTG locations farther from seven of the 29 ASLFs and shipwrecks/possible historic shipwrecks in the marine APE. These seven consist of two ASLF (Target-24 and Target-26), three known shipwrecks (Target-01, Target-06, and Target-09), and two possible historic shipwrecks (Target-07 and Target-16). Compared to the Proposed Action, the 81 WTG configuration of Alternative E2 would place WTG locations farther from one ASLF (Target-24) and one possible historic shipwreck (Target-09). Either configuration of Alterative E would have more potential for adverse effects at submerged historic properties than Alternative C but less potential for adverse effects than either Alternative D or the Proposed Action. However, Alternative E would increase the distance of Project WTGs to a different range of submerged historic properties than either Alternative C or Alternative D. Alternative E would result in similar effects to the Proposed Action at the 22 to 27 historic properties in the marine APE where its configurations do not provide farther avoidance distances.

Seafloor disturbance associated with Alternative F, which combines alternative WTG reduction options, would result in less seafloor disturbance than is anticipated for the Proposed Action or, potentially, the other action alternatives.

Alternatives C through F would use the same RWEC as that of the Proposed Action. These alternatives would result in irreversible adverse effects to historic properties where seafloor disturbance would not be avoidable at them during construction of the RWEC.

Due to the similarity in Project activities and locations, the impacts of seafloor disturbance on identified ASLFs and shipwrecks/possible historic shipwrecks from Project operations, maintenance, and decommissioning activities associated with Alternatives C through F would be similar to the Proposed Action. Seafloor disturbance, including shipwrecks and ASLF, would be negligible (not adverse) during operations and maintenance, because these activities would be restricted to areas that have been surveyed and found to contain no marine cultural resources or that have previously experienced disturbance during construction. Decommissioning activities would be expected to take place in previously disturbed areas and therefore not adverse at historic properties. Overall, the reduced scale of Alternatives C through F would result in fewer potential effects from seafloor disturbance activities than the Proposed Action.

5.2 Avoidance, Minimization, and Mitigation Measures

The Section 106 process requires BOEM to seek ways to avoid, minimize, or mitigate the adverse effects of the Project that would result from the undertaking. BOEM is approaching this process sequentially, beginning with avoidance. Avoidance of adverse effects is preferred and prioritized where practicable. BOEM would then implement minimization to reduce the adverse effect to the extent able. All adverse effects remaining after avoidance and minimization measures would be mitigated. Mitigation measures for historic properties, including NHLs, would be stipulated in the MOA and detailed in the historic property treatment plans attached to the MOA. These same mitigation measures, committed to by

Revolution Wind in the MOA and identified in COP Appendix BB – Cultural Resources Avoidance, Minimization, and Mitigation Measures (EDR 2022c), would also be incorporated by BOEM into COP approval.

BOEM remains in consultation with all consulting parties under Section 106 of the NHPA, including Tribal Nations that may have concerns for properties of traditional cultural and religious significance in the APE; State Historic Preservation Offices/Division for Historic Preservation; ACHP; NPS; and other cooperating federal agencies, local governments, historical interest groups, and involved property owners. BOEM will continue to consult with these parties on this Finding and the resolution of all adverse effects. Consistent with the provisions for NEPA substitution, pursuant to 36 CFR 800.8(c)(4)(i)(A), BOEM will codify the resolution of adverse effects through the MOA for the Project.

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APPENDIX A

Area of Potential Effects Map Figures

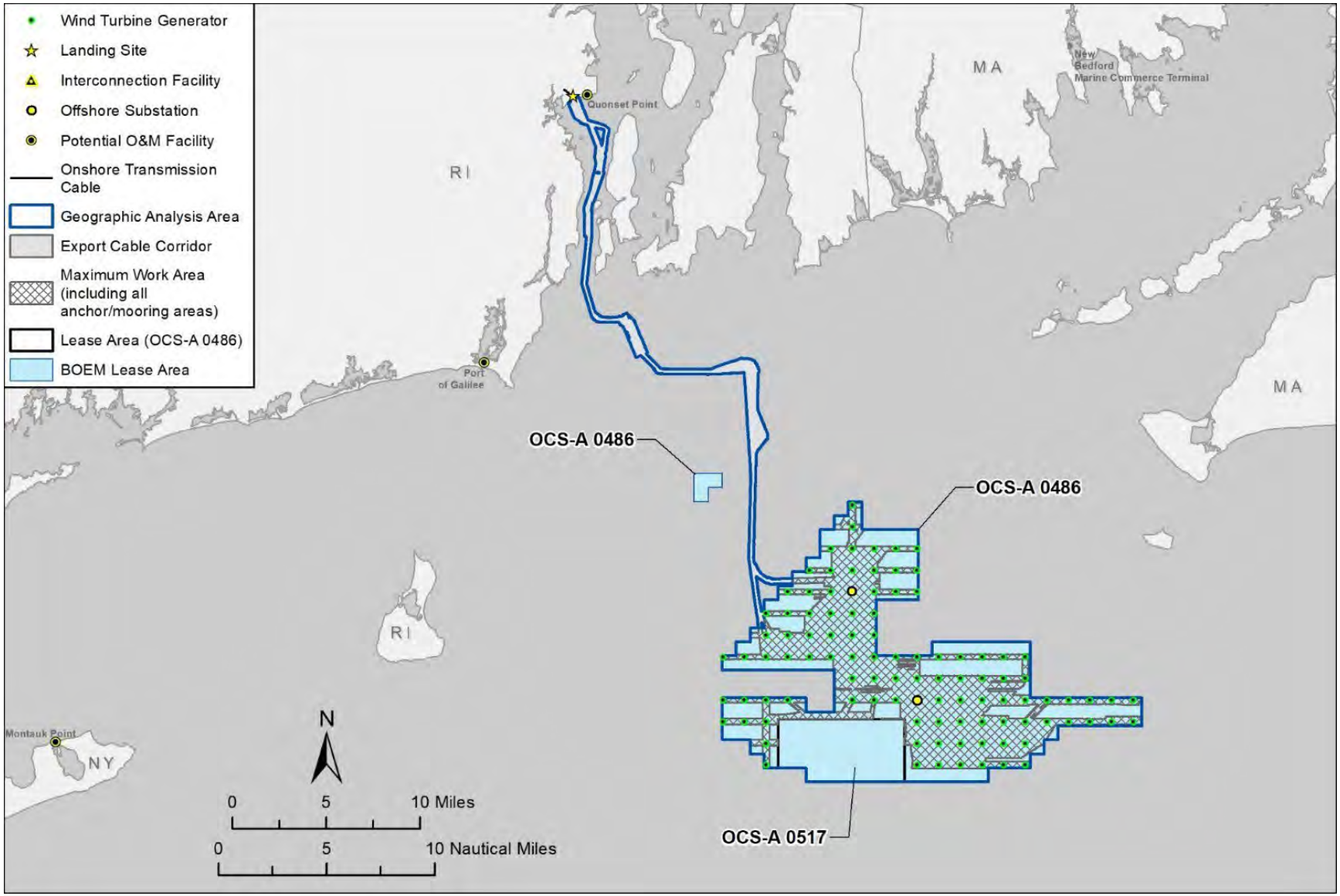


Figure A-1. Revolution Wind construction and operations plan proposed offshore Project elements.

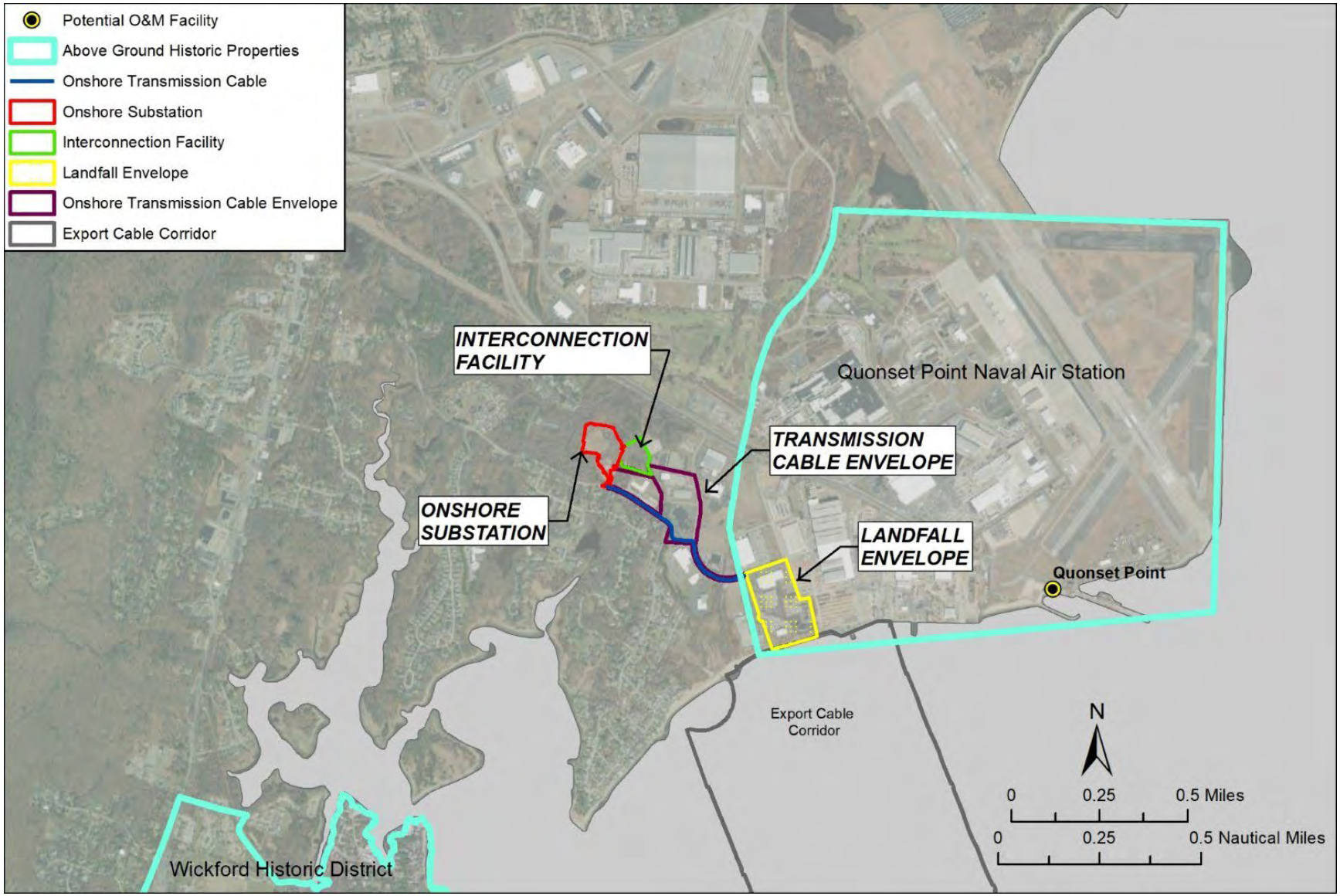


Figure A-2. Revolution Wind construction and operations plan proposed onshore Project elements.

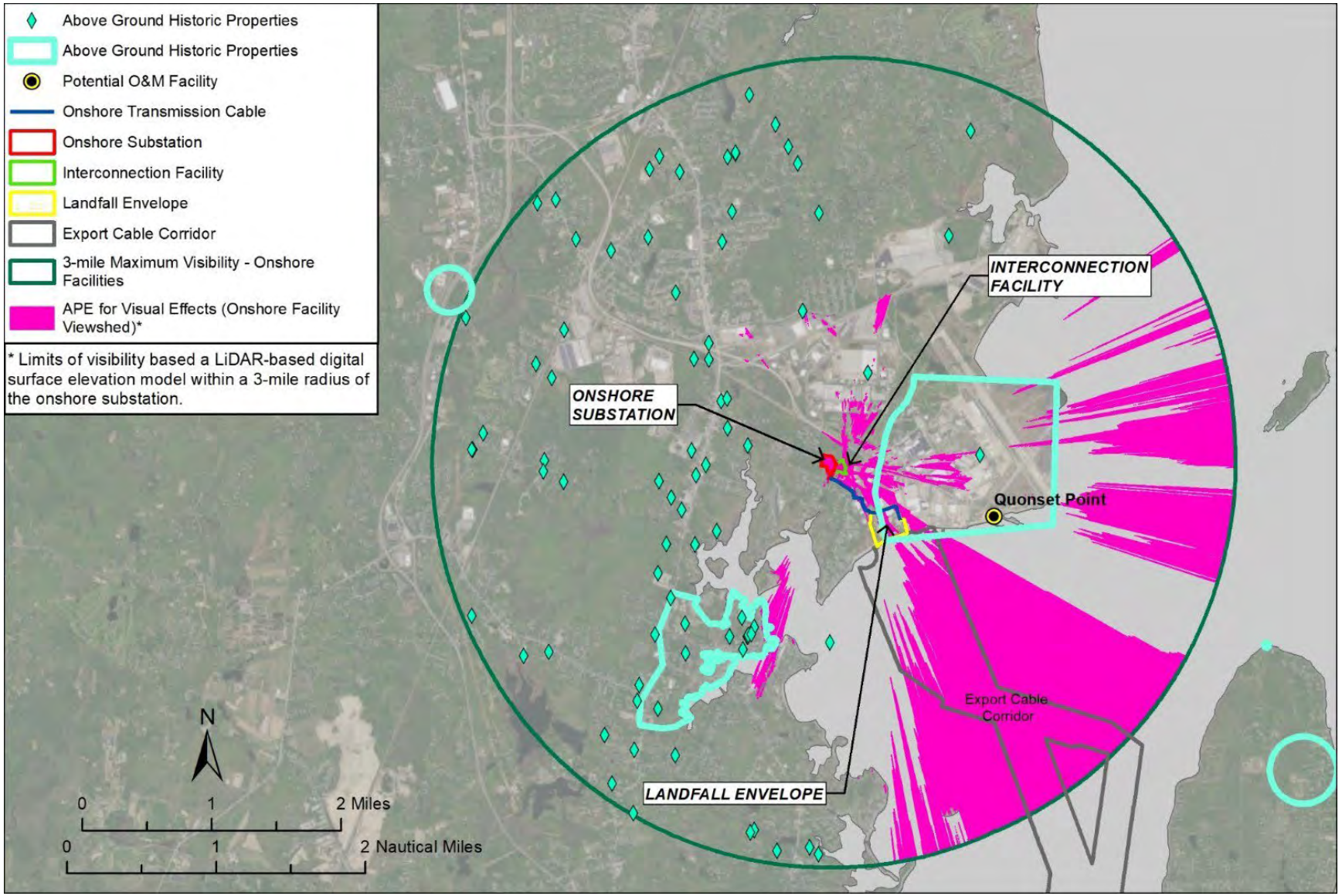


Figure A-3. Visual area of potential effects and visual effects assessment geographic analysis area – onshore.

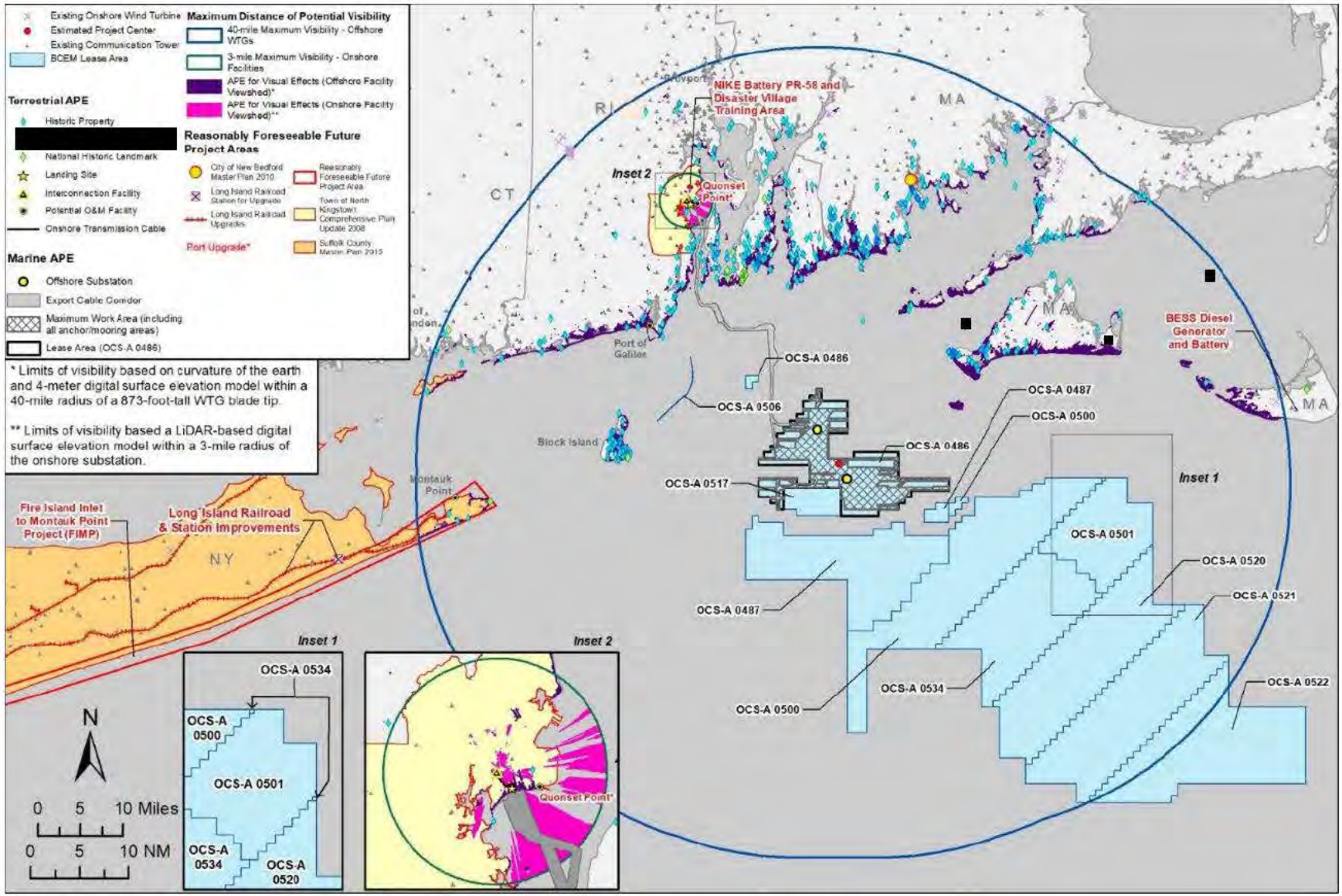


Figure A-4. Visual area of potential effects and visual effects assessment geographic analysis area – offshore.

APPENDIX B

Map Figures of Historic Properties in Relation to the Area of Potential Effects

(detached – contains material that meets the criteria for confidentiality under Section 304 of the NHPA)

APPENDIX C

Visual Simulations at the Pertinent Key Observation Points for Adversely Affected National Historic Landmarks

Revolution Wind

Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island Existing Conditions

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 96%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

Key Observation Point Information

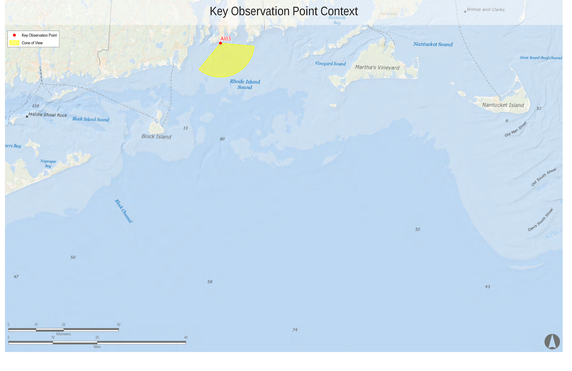
County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.





Revolution Wind

Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 96%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

Camera Information
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

Key Observation Point Information

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Town: Newport
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Visual Resources
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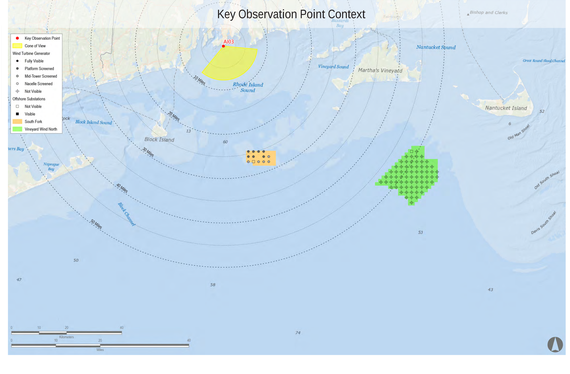
Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	12	13	24.5	28.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA

Key Observation Point Context



Key Observation Point Location



Revolution Wind | Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
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Humidity: 96%
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County: Newport
Town: Newport
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Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

Visual Resources
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

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- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
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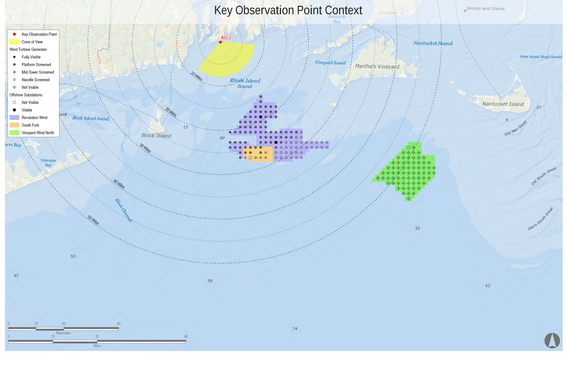
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

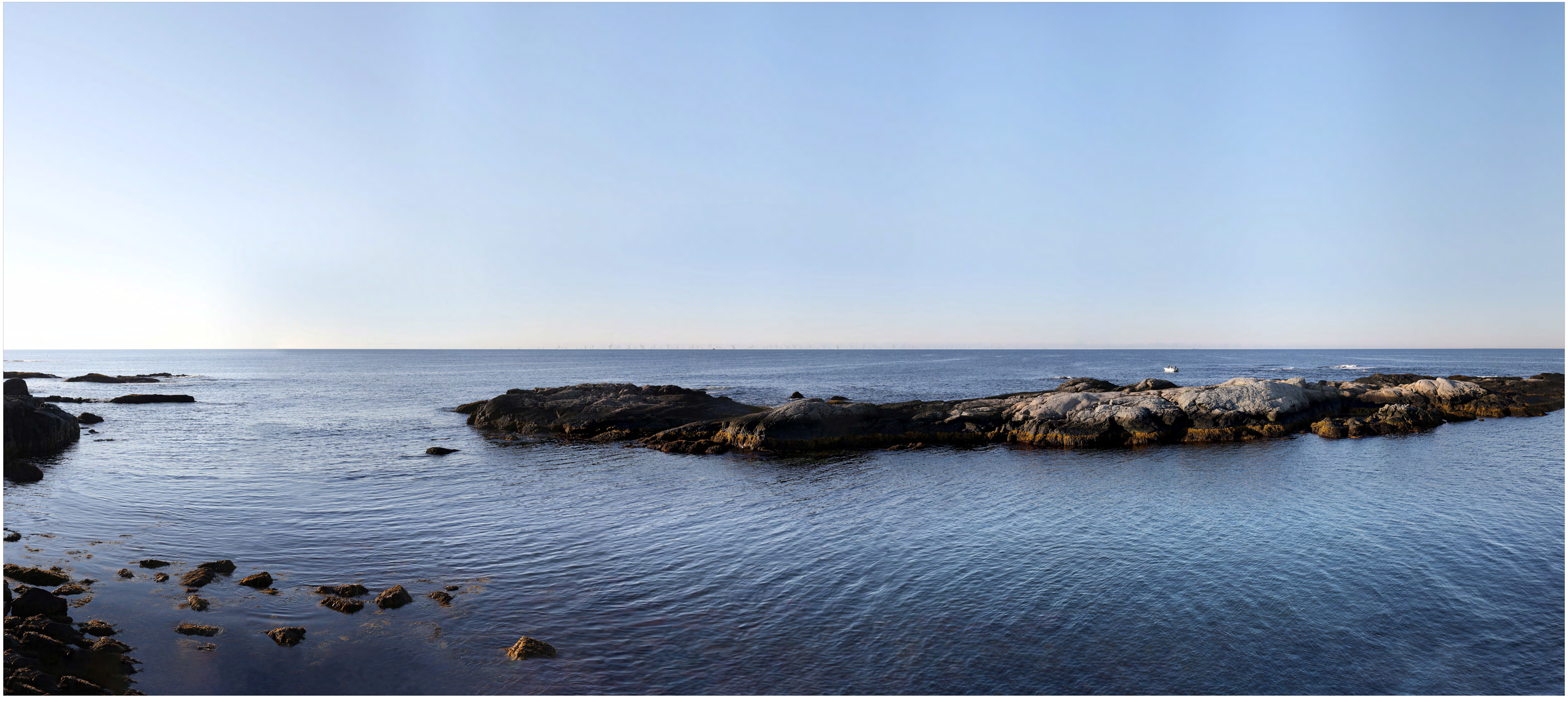
Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	12	13	24.5	28.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
Revolution Wind	2023	12 MW	102	102	15.3	33.8

Key Observation Point Context



Key Observation Point Location





Revolution Wind

Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: Full Lease Build-out Including Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 96%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

Key Observation Point Information

County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

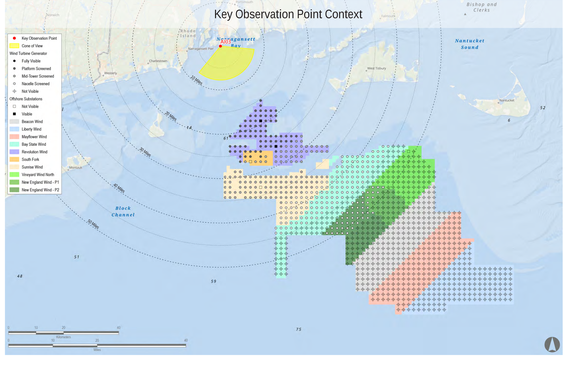
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP L04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

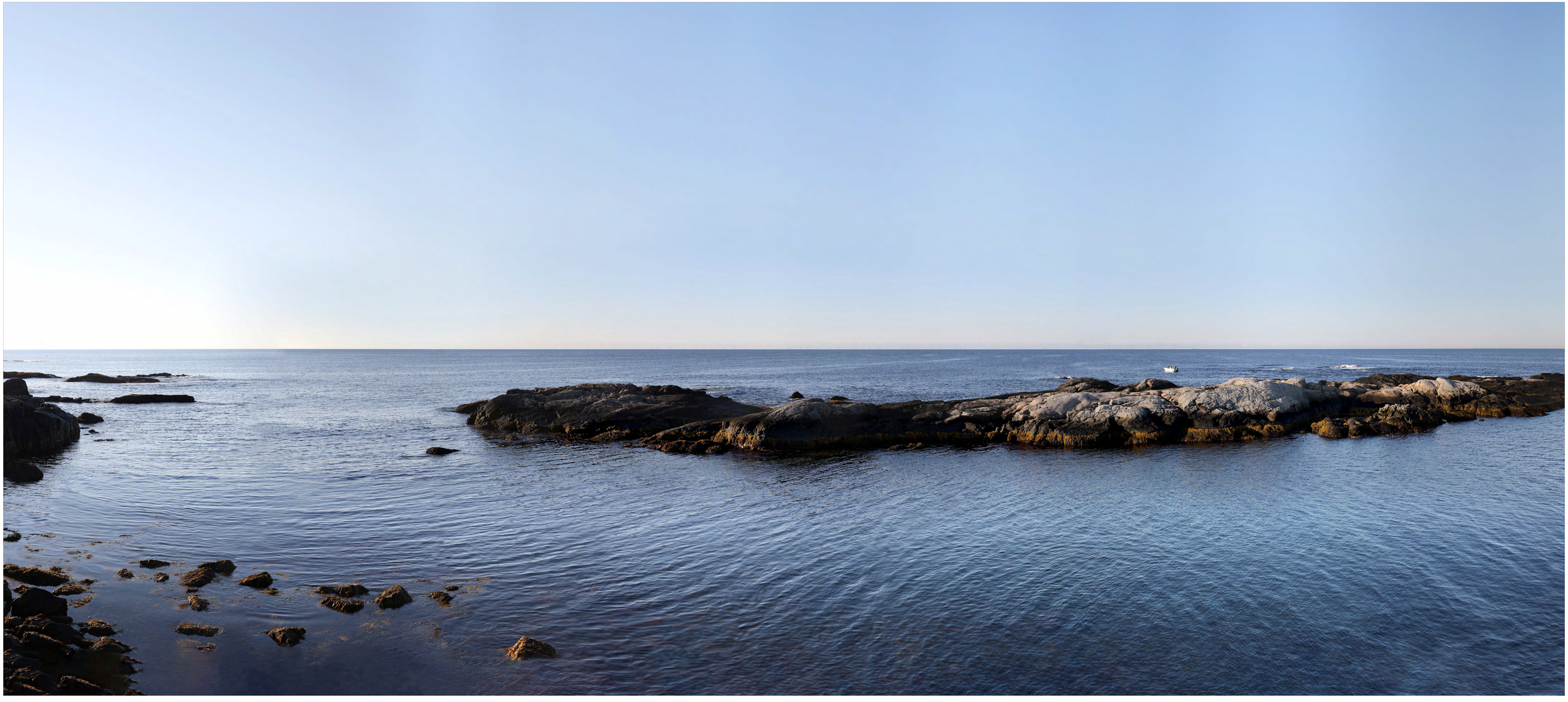
Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	12	13	24.5	28.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
Revolution Wind	2023	12 MW	102	102	15.3	33.8
New England Wind Phase 1	2024	16 MW	9	41	46.8	48.6
New England Wind Phase 2	2024	19 MW	37	79	46.0	51.1
Sunrise Wind	2024	15 MW	122	123	28.6	42.6
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	0	157	NA	NA
Bay State Wind	2025-2030	12 MW	100	185	37.1	44.5

Key Observation Point Context



Key Observation Point Location





Revolution Wind

Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: Full Lease Build-out Excluding Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 96%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

Camera Information
Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

Key Observation Point Information

County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

Visual Resources
Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP L04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	12	13	24.5	28.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
New England Wind Phase 1	2024	16 MW	9	41	46.8	48.6
New England Wind Phase 2	2024	19 MW	37	79	46.0	51.1
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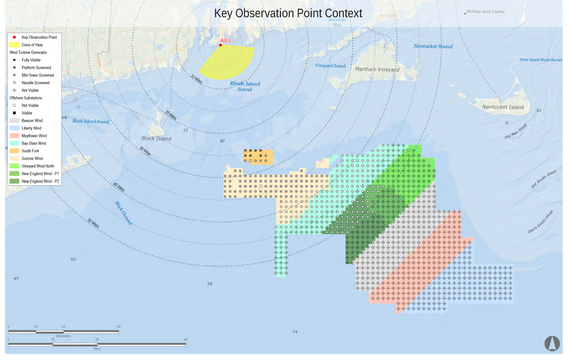
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	0	157	NA	NA
Bay State Wind	2025-2030	12 MW	100	185	37.1	44.5

Key Observation Point Context



Key Observation Point Location



Revolution Wind | Powered by Ørsted & Eversource

AI03: Newport Cliff Walk, Newport, Rhode Island

Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 7/26/2017
Time: 7:03 AM
Temperature: 59°F
Humidity: 96%
Visibility: >10 miles
Wind Direction: Calm
Wind Speed: 0 mph
Conditions Observed: Fair

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 22.8 feet AMSL

Key Observation Point Information

County: Newport
Town: Newport
State: Rhode Island
Location: Aquidneck Island
Latitude, Longitude: 41.45119° N, 71.31157° W
Direction of View (Center): South-Southeast (155.7°)
Field of View: 124° x 55°

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Shoreline Residential
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Newport/Ocean Drive State Scenic Area, Cliff Walk National Recreation Trail, Newport National Historic Landmark

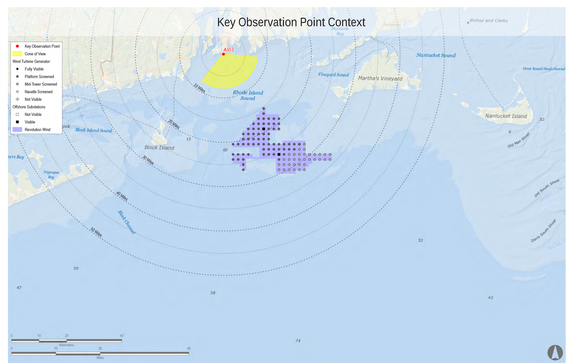
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
Revolution Wind	2023	12 MW	102	102	15.3	33.8

Key Observation Point Context



Key Observation Point Location



Revolution Wind | Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Existing Conditions

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

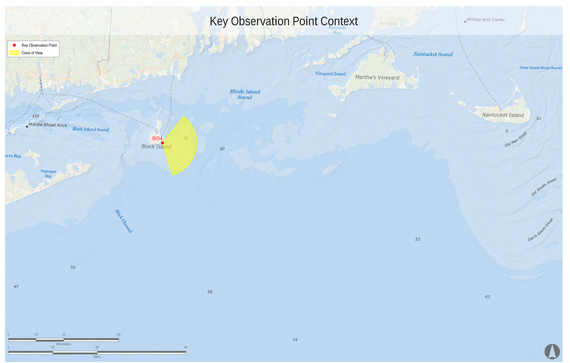
Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

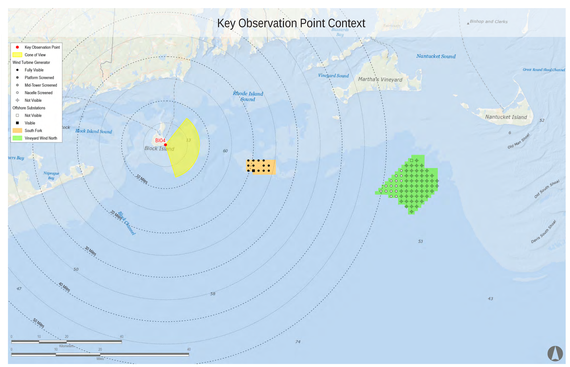
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

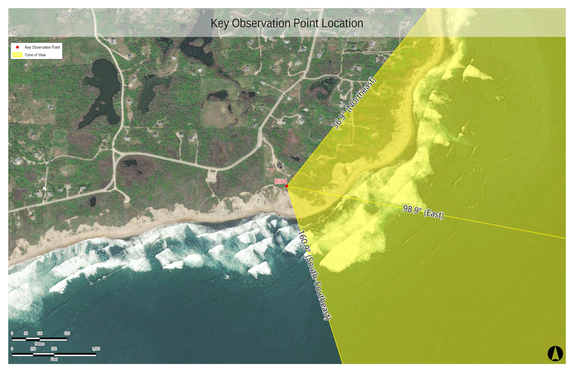
Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	15	69	49.6	53.7

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

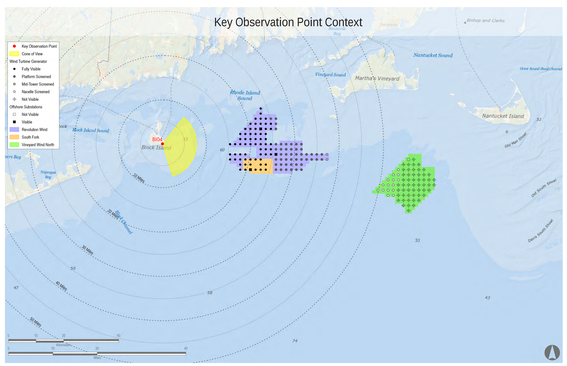
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	15	69	49.6	53.7
Revolution Wind	2023	12 MW	102	102	15.2	37.2

Key Observation Point Context



Key Observation Point Location


Key Observation Point
Cone of View
BI04
Block Island Southeast Lighthouse
Block Island Airport
Block Island State Airport
Block Island Ferry
Block Island Wind Farm
Rhode Island Sound
Block Island Sound
Vineyard Sound
Nantucket Sound
Martha's Vineyard
Nantucket Island
Old North Road
Corn Neck Road
Cow Neck Road
Ocean Road
Great Road
Bridge Road
Bishop and Clerks
Vineyard Bay
Menemsha Bight
Lobster Trap Bank
Squibnocket Point
Gay Head
Aquinnah
Cuttyhunk
Nashawena
Pasque
Naushon
Martha's Vineyard Airport
Nantucket Memorial Airport
Block Island State Airport
Block Island Airport
Block Island Ferry
Nantucket Ferry
Vineyard Haven Ferry
Oak Bluffs Ferry
Woods Hole Ferry
Hyannis Ferry
Fall River Ferry
New Bedford Ferry
Point Judith Ferry
Newport Ferry
Providence Ferry
Martha's Vineyard Ferry
Nantucket Ferry
Block Island Ferry
Cape Cod Canal
Buzzards Bay

Revolution Wind | Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Full Lease Build-out Including Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
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Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
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New England Wind Phase 1	2024	16 MW	41	41	48.0	56.6
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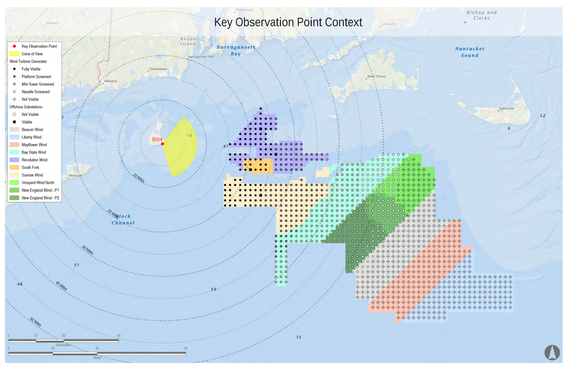
Sunrise Wind	2024	15 MW	123	123	16.9	38.8
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	13	157	51.6	53.9
Bay State Wind	2025-2030	12 MW	183	185	33.0	53.3

Key Observation Point Context



Key Observation Point Location





Revolution Wind

Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Full Lease Build-out Excluding Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

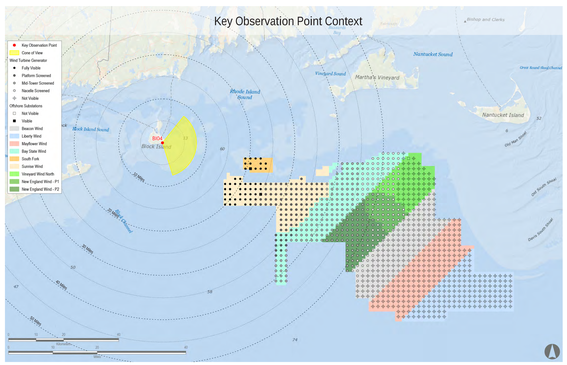
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	15	69	49.6	53.7
New England Wind Phase 1	2024	16 MW	41	41	48.0	56.6
New England Wind Phase 2	2024	19 MW	79	79	43.1	54.9
Sunrise Wind	2024	15 MW	123	123	16.9	38.8
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	13	157	51.6	53.9
Bay State Wind	2025-2030	12 MW	183	185	33.0	53.3

Key Observation Point Context


Key Observation Point
Cone of View
Wind Turbine Generator
Fully Visible
Platform Screened
Mid-Tower Screened
Nacelle Screened
Not Visible
Offshore Substations
Not Visible
Visible
Beacon Wind
Liberty Wind
Mayflower Wind
Bay State Wind
South Fork
Sunrise Wind
Vineyard Wind North
New England Wind - P1
New England Wind - P2
Block Island
BI04
Rhode Island Sound
Block Island Sound
Vineyard Sound
Martha's Vineyard
Nantucket Sound
Nantucket Island
Bishop and Clerks
Great Round Shoal Channel
Muskeget Channel
Tuckernuck Island
Old South Shoal
Nantucket Shoals
Horse Shoal
Hedges
Tuckernuck Shoal
Muskeget Shoal
Davis South Shoal
Davis North Shoal
Hoses Hole
Hedges Hole
Nantucket Lightship Area
Nantucket Lightship
Nantucket Shoals Dredged Disposal Site
Nantucket Shoals Dredged Material Disposal Site
Nantucket Shoals Dredged Material Disposal Site Buffer
Nantucket Shoals Dredged Material Disposal Site Buffer
Nantucket Shoals Dredged Material Disposal Site Buffer

Revolution Wind | Powered by Ørsted & Eversource

BI04: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Time: 12:20 PM
Temperature: 68°F
Humidity: 63%
Visibility: >10 miles
Wind Direction: Northeast
Wind Speed: 8 mph
Conditions Observed: Clear

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

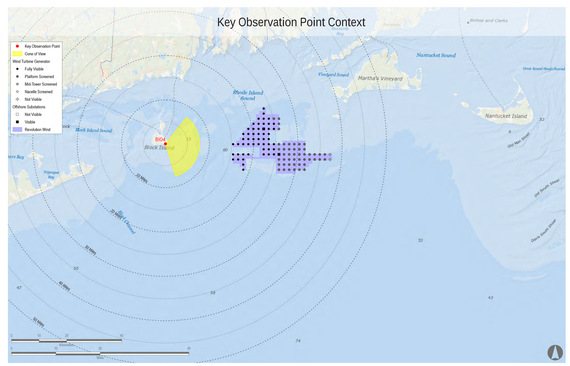
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
Revolution Wind	2023	12 MW	102	102	15.2	37.2

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Existing Conditions

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

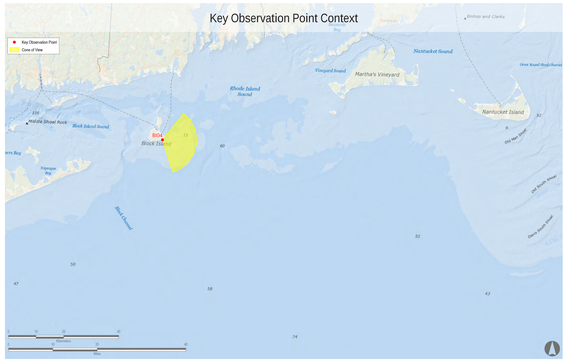
Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Key Observation Point Context


Key Observation Point
Cone of View
Bishop and Clerks
Nantucket Sound
Vineyard Sound
Martha's Vineyard
Rhode Island Sound
Nantucket Island
Block Island Sound
Block Island
Mohegan Bluffs
Block Island
Southeast Lighthouse
North Light
Old Harbor
New Harbor
Great Salt Pond
Harbor
Old Harbor
Crescent Beach
Corn Neck
Beach
Channel
Old Harbor
Great Round Rock
Round Rock
Old Harbor
Old North Shore
New North Shore
Old Harbor
Old Harbor
Old Harbor

Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: 2023 Project Construction (South Fork Wind and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1' long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

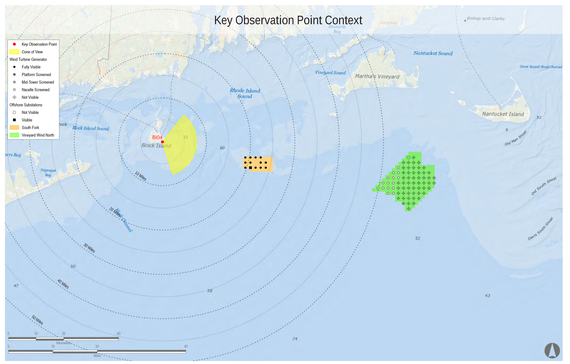
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

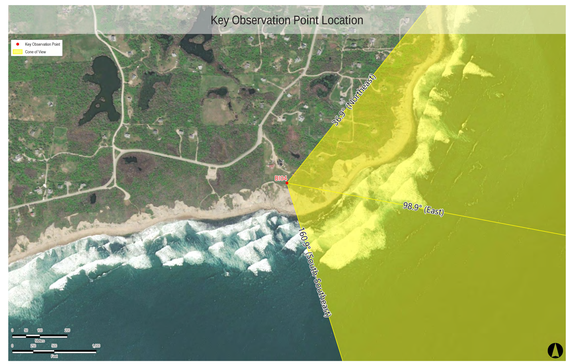
Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: 2023 Project Construction with Revolution Construction added (Revolution Wind, South Fork Wind, and Vineyard Wind North)

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

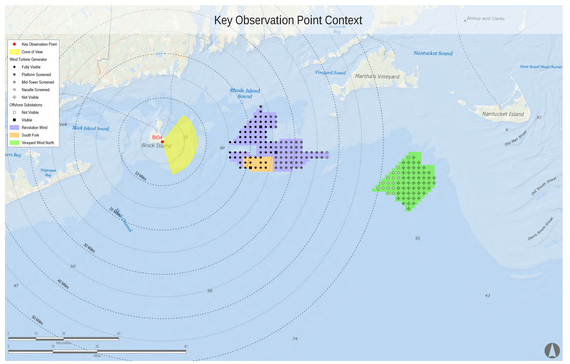
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Nearest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
Revolution Wind	2023	12 MW	102	102	15.2	37.2

Key Observation Point Context


Key Observation Point
Cone of View
Wind Turbine Generator
Fully Visible
Platform Screened
Hub Tower Screened
Nacelle Screened
Not Visible
Offshore Substations
Not Visible
Visible
Revolution Wind
South Fork
Vineyard Wind North
Block Island Sound
Nantucket Sound
Vineyard Sound
Martha's Vineyard
Nantucket Island
Rhode Island
Block Island
Bishop and Clerks
Great Round Rock Ledge
Old Harbor Point
Old South Shore
Hither Shoal Channel
Old Man Shoal
Southeast Light
Mohegan Bluffs
Corn Hill Beach
Crescent Beach
Fresh Pond
Black Rock
Harbor
Harbor Entrance
Harbor Entrance
Harbor Entrance

Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Full Lease Build-out Including Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
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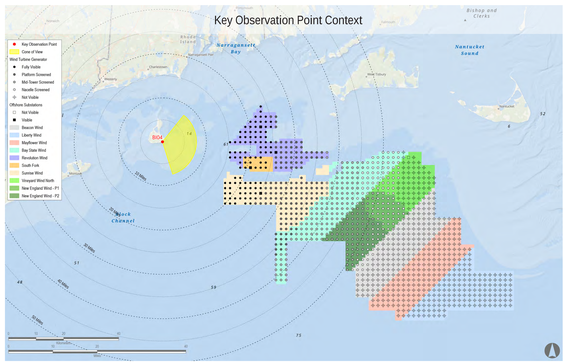
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

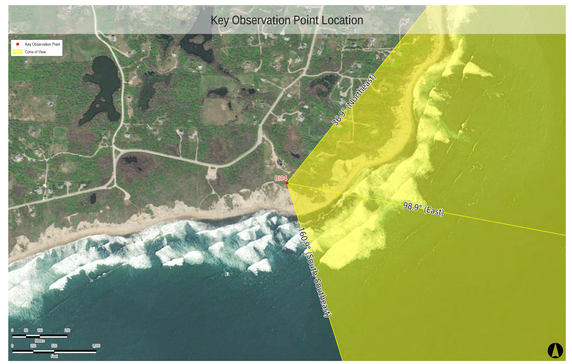
Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
Revolution Wind	2023	12 MW	102	102	15.2	37.2
New England Wind Phase 1	2024	16 MW	4	41	48.0	48.8
New England Wind Phase 2	2024	19 MW	58	79	43.1	50.7
Sunrise Wind	2024	15 MW	123	123	16.9	38.2
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	0	157	NA	NA
Bay State Wind	2025-2030	12 MW	134	185	33.0	45.0

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Full Lease Build-out Excluding Revolution Wind

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
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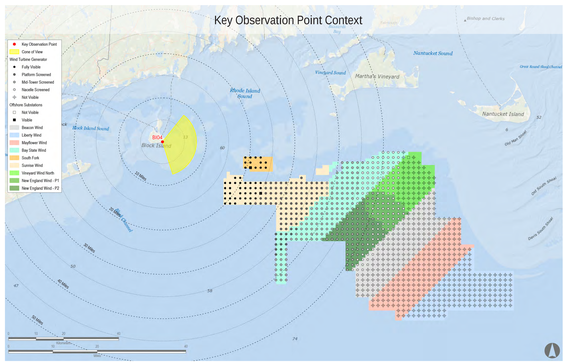
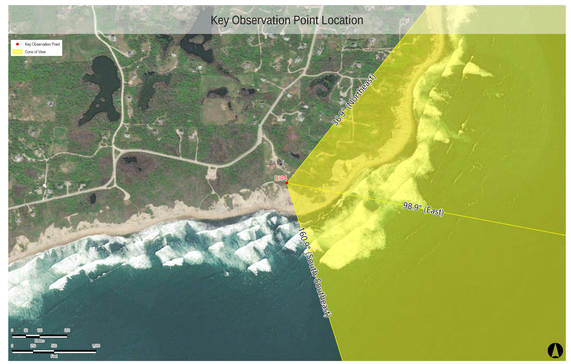
Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
South Fork Wind Farm	2023	12 MW	13	13	19.0	24.0
Vineyard Wind North	2023	14 MW	0	69	NA	NA
New England Wind Phase 1	2024	16 MW	4	41	48.0	48.8
New England Wind Phase 2	2024	19 MW	58	79	43.1	50.7
Sunrise Wind	2024	15 MW	123	123	16.9	38.2
Mayflower Wind	2024	12 MW	0	149	NA	NA
Liberty Wind	2025-2030	12 MW	0	139	NA	NA
Beacon Wind	2025-2030	12 MW	0	157	NA	NA
Bay State Wind	2025-2030	12 MW	134	185	33.0	45.0

Key Observation Point Context



Key Observation Point Location



Revolution Wind

Powered by Ørsted & Eversource

BI04 Night: Southeast Lighthouse, New Shoreham, Rhode Island

Visual Simulation: Revolution Wind Without Other Foreseeable Future Changes

Simulation Size: 64" in width by 29.3" in height. Images should be viewed from a distance of 15 inches in order to obtain the proper perspective.

This box should be exactly 1" long on the printed panorama

Environmental Data

Date Taken: 9/10/2017
Temperature: 61°F
Humidity: 93%
Visibility: >10 miles
Wind Direction: North-Northwest
Wind Speed: 6 mph
Conditions Observed: Fair

Key Observation Point Information

County: Washington
Town: New Shoreham
State: Rhode Island
Location: Block Island
Latitude, Longitude: 41.15281° N, 71.55185° W
Direction of View (Center): East (98.9°)
Field of View: 124° x 55°

Camera Information

Camera: Canon EOS 5D Mark IV
Resolution: 30.4 Megapixels
Lens Focal Length: 50 mm
Camera Height: 161.1 feet AMSL

Visual Resources

Landscape Similarity Zone: Maintained Recreation Area, Coastal Bluff
User Group: Local Resident, Tourist/Vacationers
Aesthetic Resource: Southeast Light National Historic Landmark, Mohegan Bluffs Scenic Area

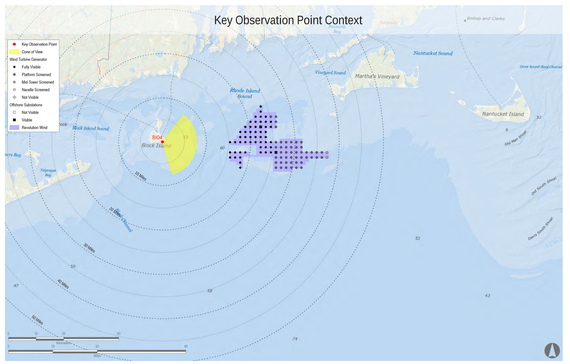
Notes:

- Photosimulation Size: 64" in width by 29.3" in height. Images should be viewed from 15 inches in order to obtain the proper perspective.
- The potential number of WTGs and OSSs screened from view was calculated using a curvature of the earth model based on the distance, viewer height, and maximum structure height. This analysis does not consider the screening effects of intervening vegetation, structures, and topography.
- Offshore Substation location and dimensions are based on preliminary publicly available project data. Projects for which this data is not currently available, WTGs are used for all foundation positions. OSS positions and dimensions considered in this photosimulation are subject to potential modification.
- Nighttime photosimulations are digitally adjusted from daytime photographs. Nighttime photographs captured at each represented KOP inform the presence or lack of existing light sources.
- The existing WTGs associated with the Block Island Wind Farm are 16.9 miles from KOP LI04. In the daytime photosimulation, the WTGs appear faint due to atmospheric perspective commonly occurring on clear days such as the conditions illustrated in this photosimulation. In order to illustrate maximum potential visibility of the proposed WTG, this degree of atmospheric perspective is not applied to the photosimulations.
- Photographs were not obtained from NL01 during field review due to public access restrictions. In place of an actual photograph from this location, EDR created a virtual three-dimensional (3D) model of the island.

Reasonably Foreseeable Projects Represented in Visual Simulation

Project	Year of Development	WTG Model	Potential Number of WTGs & OSSs Visible*	Total Number of WTGs & OSSs in Project	Distance to Nearest Visible WTG (miles)	Distance to Furthest Visible WTG (miles)
Revolution Wind	2023	12 MW	102	102	15.2	37.2

Key Observation Point Context


Key Observation Point
Cone of View
Wind Turbine Generator
Fully Visible
Platform Screened
Mid-Tower Screened
Nacelle Screened
Not Visible
Offshore Substations
Not Visible
Visible
Revolution Wind
Bishop and Clerks
Nantucket Sound
Vineyard Sound
Martha's Vineyard
Rhode Island Sound
Nantucket Island
Block Island
BI04
Block Island Sound
Great Salt Pond
Old South Shore
Inner Sound
Outer Sound
Old North Shore
Harbor Bay
Trimmers Bay
Payne Bay
Mohegan Bluffs
Southeast Light
Cormorant Cove
Corn Neck Road
Crescent Beach
Coast Guard Beach
Great Island
Cedar Tree Neck
Hog Island
Sandy Point
Fresh Pond
Andrews Farm
Beacon Hill
Clay Head
Clay Head Trail
Black Rock
Rodman Hollow
Mohegan Trail
Cow Pasture
Meadow
Lobsterville
Lobsterville Beach
Lobsterville Road
Sheep Pasture Road
Hodges Hill
Hodges Hill Road
Mansion
Mansion Road
Pilot Hill
Pilot Hill Road
Old Mill
Old Mill Road
Old Town Road
Town Hall
Town Hall Road
Spring House
Spring House Road
Center
Center Road
Ocean
Ocean Road
Dory Landing
Dory Landing Road
Corn Neck
Corn Neck Road
Beach
Beach Road
Water Tower
Water Tower Road
Cooneymus
Cooneymus Road
Island
Island Road
Pond
Pond Road
Hill
Hill Road
Point
Point Road
Bay
Bay Road
Creek
Creek Road
Harbor
Harbor Road
Light
Light Road
Lighthouse
Lighthouse Road
Trail
Trail Road
Path
Path Road
Way
Way Road
Lane
Lane Road
Drive
Drive Road
Court
Court Road
Circle
Circle Road
Place
Place Road
Square
Square Road
Terrace
Terrace Road
Boulevard
Boulevard Road
Parkway
Parkway Road
Highway
Highway Road
Freeway
Freeway Road
Expressway
Expressway Road
Turnpike
Turnpike Road
Tollway
Tollway Road
Bridge
Bridge Road
Tunnel
Tunnel Road
Overpass
Overpass Road
Underpass
Underpass Road
Interchange
Interchange Road
Intersection
Intersection Road
Roundabout
Roundabout Road
Traffic Circle
Traffic Circle Road
Rotary
Rotary Road
Cloverleaf
Cloverleaf Road
Diamond
Diamond Road
Trumpet
Trumpet Road
Directional
Directional Road
Stack
Stack Road
Flyover
Flyover Road
Ramp
Ramp Road
Exit
Exit Road
Entrance
Entrance Road
Merge
Merge Road
Yield
Yield Road
Stop
Stop Road
Signal
Signal Road
Light
Light Road
Sign
Sign Road
Marker
Marker Road
Buoy
Buoy Road
Beacon
Beacon Road
Tower
Tower Road
Mast
Mast Road
Pole
Pole Road
Line
Line Road
Cable
Cable Road
Wire
Wire Road
Fiber
Fiber Road
Optic
Optic Road
Data
Data Road
Network
Network Road
Internet
Internet Road
Wi-Fi
Wi-Fi Road
Bluetooth
Bluetooth Road
Satellite
Satellite Road
Radio
Radio Road
Antenna
Antenna Road
Transmitter
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Receiver
Receiver Road
Transceiver
Transceiver Road
Modem
Modem Road
Router
Router Road
Switch
Switch Road
Hub
Hub Road
Server
Server Road
Client
Client Road
Protocol
Protocol Road
Standard
Standard Road
Specification
Specification Road
Interface
Interface Road
Port
Port Road
Connector
Connector Road
Adapter
Adapter Road
Converter
Converter Road
Repeater
Repeater Road
Amplifier
Amplifier Road
Filter
Filter Road
Modulator
Modulator Road
Demodulator
Demodulator Road
Encoder
Encoder Road
Decoder
Decoder Road
Compressor
Compressor Road
Decompressor
Decompressor Road
Encryption
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Decryption
Decryption Road
Authentication
Authentication Road
Authorization
Authorization Road
Accounting
Accounting Road
Auditing
Auditing Road
Logging
Logging Road
Monitoring
Monitoring Road
Management
Management Road
Administration
Administration Road
Configuration
Configuration Road
Provisioning
Provisioning Road
Deployment
Deployment Road
Maintenance
Maintenance Road
Troubleshooting
Troubleshooting Road
Diagnostics
Diagnostics Road
Testing
Testing Road
Validation
Validation Road
Verification
Verification Road
Certification
Certification Road
Compliance
Compliance Road
Regulation
Regulation Road
Policy
Policy Road
Procedure
Procedure Road
Guideline
Guideline Road
Best Practice
Best Practice Road
Standard
Standard Road
Specification
Specification Road
Requirement
Requirement Road
Objective
Objective Road
Goal
Goal Road
Strategy
Strategy Road
Plan
Plan Road
Project
Project Road
Program
Program Road
Portfolio
Portfolio Road
Governance
Governance Road
Risk
Risk Road
Issue
Issue Road
Change
Change Road
Release
Release Road
Version
Version Road
Update
Update Road
Patch
Patch Road
Upgrade
Upgrade Road
Migration
Migration Road
Integration
Integration Road
Interoperability
Interoperability Road
Compatibility
Compatibility Road
Backward
Backward Road
Forward
Forward Road
Legacy
Legacy Road
Deprecated
Deprecated Road
Obsolete
Obsolete Road
Retired
Retired Road
Decommissioned
Decommissioned Road
Archived
Archived Road
Backup
Backup Road
Restore
Restore Road
Recovery
Recovery Road
Disaster
Disaster Road
Business
Business Road
Continuity
Continuity Road
Resilience
Resilience Road
Redundancy
Redundancy Road
Failover
Failover Road
Load
Load Road
Balancing
Balancing Road
Clustering
Clustering Road
Scaling
Scaling Road
Performance
Performance Road
Capacity
Capacity Road
Planning
Planning Road
Forecasting
Forecasting Road
Modeling
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Simulation
Simulation Road
Analysis
Analysis Road
Optimization
Optimization Road
Tuning
Tuning Road
Benchmarking
Benchmarking Road
Profiling
Profiling Road
Debugging
Debugging Road
Logging
Logging Road
Tracing
Tracing Road
Monitoring
Monitoring Road
Alerting
Alerting Road
Notification
Notification Road
Reporting
Reporting Road
Dashboard
Dashboard Road
Visualization
Visualization Road
Analytics
Analytics Road
Intelligence
Intelligence Road
Machine
Machine Road
Learning
Learning Road
Artificial
Artificial Road
Neural
Neural Road
Network
Network Road
Deep
Deep Road
Reinforcement
Reinforcement Road
Supervised
Supervised Road
Unsupervised
Unsupervised Road
Semi-supervised
Semi-supervised Road
Transfer
Transfer Road
Federated
Federated Road
Edge
Edge Road
Cloud
Cloud Road
Hybrid
Hybrid Road
Multi-cloud
Multi-cloud Road
Serverless
Serverless Road
Containerization
Containerization Road
Orchestration
Orchestration Road
Microservices
Microservices Road
Monolithic
Monolithic Road
Architecture
Architecture Road
Design
Design Road
Pattern
Pattern Road
Framework
Framework Road
Library
Library Road
Tool
Tool Road
Platform
Platform Road
Environment
Environment Road
Infrastructure
Infrastructure Road
Hardware
Hardware Road
Software
Software Road
Firmware
Firmware Road
Operating
Operating Road
System
System Road
Kernel
Kernel Road
Driver
Driver Road
Application
Application Road
Service
Service Road
Component
Component Road
Module
Module Road
Package
Package Road
Dependency
Dependency Road
Version
Version Road
Control
Control Road
Source
Source Road
Code
Code Road
Repository
Repository Road
Branch
Branch Road
Merge
Merge Road
Pull
Pull Road
Request
Request Road
Commit
Commit Road
Push
Push Road
Clone
Clone Road
Fork
Fork Road
Issue
Issue Road
Bug
Bug Road
Feature
Feature Road
Request
Request Road
Enhancement
Enhancement Road
Documentation
Documentation Road
Wiki
Wiki Road
Forum
Forum Road
Chat
Chat Road
Support
Support Road
Community
Community Road
Contribution
Contribution Road
Guideline
Guideline Road
Code
Code Road
Conduct
Conduct Road
License
License Road
Agreement
Agreement Road
Terms
Terms Road
Service
Service Road
Privacy
Privacy Road
Policy
Policy Road
Cookie
Cookie Road
Policy
Policy Road
Data
Data Road
Protection
Protection Road
Regulation
Regulation Road
GDPR
GDPR Road
CCPA
CCPA Road
HIPAA
HIPAA Road
SOX
SOX Road
PCI
PCI Road
DSS
DSS Road
ISO
ISO Road
27001
27001 Road
NIST
NIST Road
Cybersecurity
Cybersecurity Road
Framework
Framework Road
Risk
Risk Road
Management
Management Road
Incident
Incident Road
Response
Response Road
Plan
Plan Road
Business
Business Road
Impact
Impact Road
Analysis
Analysis Road
Vulnerability
Vulnerability Road
Assessment
Assessment Road
Penetration
Penetration Road
Testing
Testing Road
Security
Security Road
Audit
Audit Road
Compliance
Compliance Road
Assessment
Assessment Road
Gap
Gap Road
Analysis
Analysis Road
Remediation
Remediation Road
Plan
Plan Road
Security
Security Road
Awareness
Awareness Road
Training
Training Road
Program
Program Road
Phishing
Phishing Road
Simulation
Simulation Road
Social
Social Road
Engineering
Engineering Road
Awareness
Awareness Road
Training
Training Road
Security
Security Road
Culture
Culture Road
Program
Program Road
Metrics
Metrics

DRAFT MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND FARM AND REVOLUTION WIND EXPORT CABLE PROJECT

WHEREAS, the Bureau of Ocean Energy Management (BOEM) plans to authorize construction and operation of the Revolution Wind Farm and Revolution Wind Export Cable Project (Project) pursuant to Section 8(p)(1)(C) of the Outer Continental Shelf (OCS) Lands Act (43 U.S.C. 1337(p)(1)(C)), as amended by the Energy Policy Act of 2005 (Public Law No. 109-58) and in accordance with Renewable Energy Regulations at 30 Code of Federal Regulations (CFR) Part 585; and

WHEREAS, BOEM determined that the Project constitutes an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC 306108), and its implementing regulations (36 CFR 800); and

WHEREAS, BOEM plans to approve with conditions the Construction and Operations Plan (COP) submitted by Revolution Wind, LLC (Revolution Wind); and

WHEREAS, BOEM determined the construction, operation, maintenance, and eventual decommissioning of the Project, designed for up to 100 offshore Wind Turbine Generators (WTGs), up to two offshore substations, up to two export cables collocated in one easement connecting from the OCS to landfall on Rhode Island shores, one onshore transmission cable connecting from landfall to one onshore substations and adjacent interconnection facility (ICF) with a buried connection line, and an overhead connection from the ICF to the existing TNEC Davisville Substation have the potential to adversely affect historic properties as defined under 36 CFR 800.16(l); and

WHEREAS, BOEM is preparing an Environmental Impact Statement (EIS) for the Project pursuant to the National Environmental Policy Act (42 USC 4321 et seq.) (NEPA) and elected to use the NEPA substitution process with its Section 106 consultation pursuant to 36 CFR 800.8(c); and

WHEREAS, BOEM notified in advance the State Historic Preservation Officers (SHPOs) of Connecticut, Massachusetts, New York, and Rhode Island and the Advisory Council on Historic Preservation (ACHP) on April 6, 2021 of their decision to use NEPA substitution and followed the standards for developing environmental documents to comply with the Section 106 consultation for this Project pursuant to 36 CFR 800.8(c), and posted this decision in the Federal Register with BOEM's Notice of Intent to prepare an EIS for the Project on April 30, 2021; and

WHEREAS, BOEM notified and invited the Secretary of the Interior (represented by the National Park Service (NPS)) to consult regarding this Project pursuant to the Section 106 regulations, including consideration of the potential effects to National Historic Landmarks (NHLs) as required under NHPA Section 110(f) (54 USC 306107) and 36 CFR 800.10, the NPS accepted BOEM's invitation to consult, and BOEM invited the NPS to sign this MOA as a concurring party; and

WHEREAS, in accordance with 36 CFR 800.3, BOEM invited Connecticut SHPO, Massachusetts SHPO, Rhode Island SHPO, and New York SHPO to consult on the Project on April 2, 2021, and Connecticut SHPO formally accepted on April 30, 2021, and Massachusetts SHPO, Rhode Island SHPO, and New York SHPO accepted through participation in consultation following that date; and

WHEREAS, the Project is within a commercial lease area that was subject to previous NHPA Section 106 review by BOEM regarding the issuance of the commercial lease and approval of site

assessment activities. Both Section 106 reviews for the lease issuance and the approval of the site assessment plan were conducted pursuant to the PA and concluded with No Historic Properties Affected for lease issuance on June 4, 2013, and site assessment approval on October 12, 2017 consistent with the Programmatic Agreement (PA) regarding the review of OCS renewable energy activities offshore Massachusetts and Rhode Island (*Programmatic Agreement Among The U.S. Department of the Interior, Bureau of Ocean Energy Management; the State Historic Preservation Officers of Massachusetts and Rhode Island; The Mashpee Wampanoag Tribe; the Narragansett Indian Tribe; the Wampanoag Tribe of Gay Head (Aquinnah); and the Advisory Council on Historic Preservation; Regarding the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island*) (Attachment 1).

WHEREAS, consistent with 36 CFR 800.16(d) and BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 27, 2020), BOEM defined the area of potential effects (APE) for the undertaking as the depth and breadth of the seabed potentially impacted by any bottom-disturbing activities, constituting the marine archaeological resources portion of the APE (marine APE); the depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities, constituting the terrestrial archaeological resources portion of the APE (terrestrial APE); the viewshed from which offshore or onshore renewable energy structures would be visible, constituting the viewshed portion of the APE (visual APE); and any temporary or permanent construction or staging areas that may fall into any of the aforementioned offshore or onshore portions of the APE (see Attachment 2 APE Maps); and

WHEREAS, BOEM identified 451 aboveground historic properties in the offshore Project components' portion of the visual APE and two historic properties in the onshore Project components' portion of the visual APE; nineteen submerged historic properties and ten ancient submerged landforms and features (ASLFs) in the marine APE; and two historic properties in the terrestrial APE; and

WHEREAS, BOEM identified twelve NHLs within the visual APE for onshore and offshore development; and

WHEREAS, within the range of Project alternatives analyzed in the EIS (EIS Chapter 2, Table 2.1-1), BOEM determined that 101 aboveground historic properties would be subject to visual adverse effects from WTGs (see Attachment 3), no submerged historic properties related to shipwrecks or sunken crafts will be adversely affected by physical disturbance from export cable construction within the avoidance buffers of these resources, nine ASLFs may be potentially adversely affected by physical disturbance in the lease area and from export cable construction, and two historic properties in the terrestrial APE would be adversely affected with implementation of the undertaking; and

WHEREAS, BOEM determined that the implementation of project design and avoidance measures identified in this MOA will avoid adverse effects to 350 aboveground historic properties in the offshore visual APE (including seven NHLs), and to 19 submerged shipwrecks or sunken crafts and to one ASLF in the marine APE; and

WHEREAS, BOEM determined all of the ASLFs identified in the marine APE are eligible for the National Register of Historic Places (NRHP) under Criteria A and D; and

WHEREAS, under each of the Project alternatives analyzed in the EIS, BOEM determined the Project would visually adversely affect the 101 aboveground historic properties in Massachusetts and Rhode Island, including five NHLs; and

WHERAS, BOEM has identified historic sunken military craft (i.e., USS S-51) in the marine APE that are subject to the Sunken Military Craft Act (Public Law 108–375 Title XIV), administered by the

Department of the Navy for the protection of these craft and associated remains, BOEM has invited the Department of the Navy to consult on this undertaking and they accepted the invitation, and BOEM and the Department of the Navy will continue to coordinate consultation on the Sunken Military Craft Act through this Section 106 review to ensure compliance with that act; and

WHEREAS, the Connecticut SHPO, Massachusetts SHPO, New York SHPO, and Rhode Island SHPO concurred with BOEM's finding of adverse effect on [insert dates of SHPO's concurrence for the Massachusetts SHPO, Rhode Island SHPO, Connecticut SHPO, and New York SHPO]; and

WHEREAS, throughout this document the term 'Tribal Nation' has the same meaning as a federally recognized 'Indian Tribe,' as defined at 36 CFR 800.16(m); and

WHEREAS, BOEM invited the following federally recognized Tribal Nations to consult on this Project: Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation; and

WHEREAS, the Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head (Aquinnah), Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation accepted BOEM's invitation to consult and BOEM invited these Tribal Nations to sign this MOA as concurring parties; and

WHEREAS, in accordance with 36 CFR 800.3, BOEM invited other federal agencies, state and local governments, and additional consulting parties with a demonstrated interest in the undertaking to participate in this consultation, the list of those accepting participation and declining to participate by either written response or no response to direct invitations are listed in Attachment 4; and

WHEREAS, BOEM has consulted with Revolution Wind in its capacity as applicant seeking federal approval of the COP, and, because Revolution Wind has responsibilities under the MOA, BOEM has invited the applicant to be an invited signatory to this MOA; and

WHEREAS, in accordance with 36 CFR 800.6(a)(1), BOEM has notified the ACHP of its adverse effect determination with specified documentation, and ACHP is consulting on the resolution of adverse effects to the historic properties pursuant to 36 CFR 800.6(a)(1)(iii); and

WHEREAS, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, Department of the Army permits will be required from the United States Army Corps of Engineers (USACE) for this Project and BOEM invited USACE to consult; and

WHEREAS, the USACE designated BOEM as the Lead Federal Agency pursuant to 36 CFR 800.2(a)(2) to act on its behalf for purposes of compliance with Section 106 for this Project (in a letter dated July 27, 2022), BOEM invited the USACE to sign this MOA as a concurring party, and the USACE accepted the invitation to sign this MOA as a concurring party;

WHEREAS, BOEM has consulted with the signatories, invited signatories, and consulting parties participating in the development of this MOA regarding the delineation of the APEs, the identification and evaluation of historic properties, the assessment of potential effects to the historic properties, and on measures to avoid, minimize, and mitigate adverse effects to historic properties; and

WHEREAS, pursuant to 36 CFR 800.6, BOEM invited Revolution Wind to sign as an invited signatory and the consulting parties as listed in Attachment 4 to sign as concurring parties; however, the refusal of any consulting party to sign this MOA or otherwise concur does not invalidate or affect the effective date of this MOA, and consulting parties who choose not to sign this MOA will continue to

receive information if requested and have an opportunity to participate in consultation as specified in this MOA; and

WHEREAS, the signatories agree, consistent with 36 CFR 800.6(b)(2), that adverse effects will be resolved in the manner set forth in this MOA; and

WHEREAS, BOEM sought and considered the views of the public regarding Section 106 for this Project through the NEPA process by holding virtual public scoping meetings when initiating the NEPA and NHPA Section 106 review on May 13, 18, and 20, 2021 and virtual public hearings related to the Draft EIS on [Month XX, 2022], [Month XX, 2022], and [Month XX, 2022], 2022; and

WHEREAS, BOEM made the first Draft MOA available to the public for review and comment from [Month XX, 2022], to [Month XX, 2022], and made an updated version of the Draft MOA available to the public from [Month XX, 2022], to [Month XX, 2022], using BOEM's Project website, and BOEM [did or did not receive any comments from the public]; and

NOW, THEREFORE, BOEM, the Connecticut SHPO, Massachusetts SHPO, New York SHPO, and Rhode Island SHPO, and the ACHP agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

BOEM, with the assistance of Revolution Wind, shall ensure that the following measures are carried out as conditions of its approval of the undertaking:

I. MEASURES TO AVOID ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. BOEM will include the following avoidance measures for adverse effects within the marine APE as conditions of approval of the Revolution Wind COP:

    i. Revolution Wind will avoid the 19 known shipwreck or sunken craft sites and potentially significant debris fields previously identified during marine archaeological surveys (Target-01 to Target-11 and Target-13 to Target-20) by a distance of no less than 164 feet (50 meters) from the known extent of the resource for placement of Project structures and when conducting seafloor-disturbing activities, to the extent practicable.

    ii. Revolution Wind will avoid ASLFs previously identified during marine archaeological resource assessments for the Project by a distance of no less than 164 feet (50 meters) from the known extent of the resource for placement of Project structures and when conducting seafloor-disturbing activities, to the extent practicable. Target-27 is avoidable and adverse effects to other ASLF could be avoidable through micrositing or through design options dependent on WTG placement and Project alternative selection.

II. MEASURES TO MINIMIZE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. Should full avoidance not be feasible for known ASLFs (Targets 21–26 and 28–30), Revolution Wind in consultation with BOEM will minimize the extent of project disturbance introduced on these sites. Disturbed portions of ASLFs will be addressed under mitigation

measures at MOA Stipulations III. Actions during minimization and mitigation at ASLFs would necessarily require the consultation with Tribal Nations.

B. Terrestrial APE

1. Although the [redacted] #1 and [redacted] #2 sites were determined by BOEM to not be avoidable by project disturbance, Revolution Wind will minimize the extent of Project disturbance within these site areas to the extent practicable by protecting undisturbed site portions from Project impacts during construction, operations, maintenance, decommissioning and environmental restoration activities or mitigate those site portions prior to such activities. Protection measures may include fencing the resources or similar means to separate projects activities from the undisturbed site portions. Mitigation is described under Stipulation III, below.

C. Visual APE

1. BOEM has undertaken planning and actions to minimize adverse effects to aboveground historic properties in the visual APE. BOEM will include these minimization measures for adverse effects within the visual APE as conditions of approval of the Revolution Wind COP:

   i. Revolution Wind will use uniform WTG design, speed, height, and rotor diameter to reduce visual contrast and decrease visual clutter.

   ii. Revolution Wind will use uniform spacing of 1 nautical mile (1.15 mile) to decrease visual clutter, aligning WTGs to allow for safe transit corridors.

   iii. The option to reduce the number of constructed WTGs from a maximum proposed number of 100.

   iv. Revolution Wind will apply a paint color to the WTGs no lighter than RAL 9010 pure white and no darker than RAL 7035 light gray to help reduce potential visibility of the turbines against the horizon during daylight hours.

   v. Revolution Wind will implement an aircraft detection lighting system (ADLS) to automatically activate lights when aircraft approach. The WTGs and OSS would be lit and marked in accordance with FAA and USCG lighting standards and consistent with BOEM's *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development* (April 28, 2021) to reduce light intrusion.

III. MEASURES TO MITIGATE ADVERSE EFFECTS TO IDENTIFIED HISTORIC PROPERTIES

A. Marine APE

1. Revolution Wind cannot avoid nine ASLFs (Targets 21 through 26, and Targets 29 and 30). To resolve the adverse effects to the nine ASLFs, BOEM will include the following as conditions of approval of the Revolution Wind COP and require fulfillment of the following as mitigation measures prior to construction. Revolution Wind will fund mitigation measures as described in Attachment 5 (Historic Property Treatment Plan for the Revolution Wind Farm Ancient Submerged Landforms, Outer Continental Shelf, Federal and Rhode Island Waters of Rhode Island Sound):

   i. Preconstruction Geoarchaeology. Revolution Wind will fulfill the following commitments: collaborative review of existing geophysical and geotechnical data with

Tribal Nations; selection of coring locations in consultation with Tribal Nations; collection of two to three vibracores within each affected ASLF with a sampling focus on areas that will be disturbed by Project construction activities; written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work; collaborative laboratory analyses at a laboratory located in Rhode Island or Massachusetts; screening of recovered sediments for debitage or micro-debitage associated with indigenous land uses; third-party laboratory analyses, including micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and chemical analyses for potential indirect evidence of indigenous occupations; temporary curation of archival core sections; draft reports for review by interested consulting ; final reporting; and public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting Tribal Nations.

a. The Preconstruction Geoarchaeology effort will be conducted in accordance with BOEM's Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585. The qualified professional archaeologists leading the research will meet the SOI professional qualification standards for archeology (62 FR 33708) and BOEM's standards for Qualified Marine Archaeologists.

b. Revolution Wind will submit the Draft Tribal Audience Report, Draft Technical Report, Final Tribal Audience Report, Final Technical Report, and Draft Public or Professional Presentations to the interested consulting parties for review. Revolution Wind will provide draft descriptions and documentation of the GIS to the interested consulting parties for review and will provide a description of the draft Story Maps to the interested consulting Tribal Nations following the initial working sessions.

ii. Open-Source GIS and Story Maps. Revolution Wind will fulfill the following commitments: consultation with the Tribal Nations to determine the appropriate open-source GIS platform; review of candidate datasets and attributes for inclusion in the GIS; data integration; development of custom reports or queries to assist in future research or tribal maintenance of the GIS; work Sessions with Tribal Nations to develop Story Map content; training session with Tribal Nations to review GIS functionality; review of Draft Story Maps with Tribal Nations; delivery of GIS to Tribal Nations; and delivery of Final Story Maps.

a. The GIS developed under this measure will be free to use and free to modify by the tribes. To the extent feasible, all data will be provided in formats that allow for interoperability with other GIS platforms that the tribes may use. All datasets incorporated in the GIS will comply with Federal Geographic Data Committee data and metadata standards.

b. Revolution Wind will submit the Description of the GIS with appropriate schema, data organization, and custom reports/queries, Draft Story Map descriptions with details on content, formatting, and intended audiences, and Final Technical Description of the GIS with schema, data organization, and custom reports/queries to the interested consulting parties for review.

B. Terrestrial APE

1. Revolution Wind cannot avoid [redacted] #1 and [redacted] #2 sites by project disturbances. To resolve the adverse effects to the two archaeological sites, BOEM will include the following as conditions of approval of the Revolution Wind COP and require fulfillment of the following as mitigation measures prior to construction. Revolution Wind will fund mitigation measures as described in Attachment 6 (Historic Property Treatment Plan for the Revolution Wind Farm, the [redacted] #1 and #2 Sites, Town of North Kingstown, Washington County, Rhode Island):

    i. Data Recovery Investigations. Revolution Wind will fulfill the following commitments: The preparation of a Phase III Work Plan for submission and review by the Rhode Island State Historic Preservation Officer (RI SHPO), BOEM and Tribal Nations that specifies the scope of the proposed Phase III investigation; field investigation of approximately 20% of the affected sections of both historic properties, including a mix of Shovel Test Probes and 1x1-meter excavation units to document the stratigraphic integrity of the site, investigate artifact concentrations, and/or investigate potential features more precisely; feature documentation and excavation; and artifact recovery, processing, and analysis.

        a. Revolution Wind will develop the project consistent with the Rhode Island Historical Preservation & Heritage Commission's (RIHPC) Standards for Archaeological Survey (the *Standards)* and Rhode Island Historical Preservation & Heritage Commission's (RIHPHC) Performance Standards and Guidelines for Archaeology in Rhode Island (the *Guidelines)*.

        b. Revolution Wind will submit the Phase III Work Plan, Draft Phase III Archaeological Data Recovery Report, and Final Phase III Archaeological Data Recovery Report to the interested consulting parties for review. The reports will be prepared in accordance with the *Standards*.

C. Visual APE

1. BOEM will ensure the following mitigation measures to resolve the adverse effects to historic properties are required as conditions of approval of the Revolution Wind COP and are implemented by Revolution Wind, unless otherwise specified.

    i. [redacted] Traditional Cultural Property. BOEM will include the following as described in Attachment 7 (Historic Properties Treatment Plan for the Revolution Wind Farm: the [redacted] Traditional Cultural Property [redacted], Massachusetts & Atlantic Outer Continental Shelf) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

        a. GIS Database of Contributing Resources to the TCP

            1) Revolution Wind will fund the development of a GIS database incorporating the results of on-going documentation of the TCP and will include information on existing conditions at each contributing resource and/or significant element of the TCP district as described in Attachment 7.

            2) Revolution Wind will have the documentation developed by professions meeting the qualifications specialized in the Secretary of the Interior's (SOI)

Professional Qualifications Standards (36 CFR Part 61). The GIS will be developed by professionals with demonstrated experience in the creation and organization of spatial databases of cultural resources and the relevant and specific attributes necessary for recordation and management. The GIS development will be overseen by a qualified Geographic Information Systems Professional

3) Revolution Wind will submit the Request for Proposal (RFP), proposals by qualified consultants in response to the RFP, preliminary draft of the exhibit, and final exhibit to the interested consulting parties for review.

b. Development of Interpretative Materials

1) Revolution Wind will fund the development of GIS story maps or comparable presentations could include relevant archival data, oral histories, news stories, video footage, and public domain datasets [redacted] as described in Attachment 7.

2) Revolution Wind will have the documentation developed by a qualified Geographic Information Systems Professional

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, draft deliverables, and final deliverables to the interested consulting parties for review.

c. Climate Adaptation Planning Study

1) Revolution Wind will fund the development of a Climate Adaptation Plan that is focused on the specific resources and characteristics of the [redacted] and needs of the associated traditional community as described in Attachment 7.

2) Revolution Wind will have the documentation developed by qualified professionals with Global Association of Risk Professionals' Sustainability and Climate Risk certification and/or demonstrated experience in the preparation of climate change risk assessments for municipal, state, or federal governments.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, draft plan, and final plan to the interested consulting parties for review.

ii. [redacted] Traditional Cultural Property. BOEM will include the following as described in Attachment 8 ([redacted] Traditional Cultural Property [redacted], Massachusetts & Atlantic Outer Continental Shelf) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Support for [redacted]

1) Revolution Wind will fund the development of a non-proprietary spatial database of contributing resources and associated physical features to assist in prioritizing preservation efforts and ensure that accurate information is available to support local, state, and federal consideration of TCP impacts in future permitting processes as described in Attachment 8.

2) The GIS database will be developed by professionals with demonstrated experience in the creation and organization of spatial databases of cultural resources and the relevant and specific attributes necessary for recordation and management. The GIS development will be overseen by a qualified Geographic Information Systems Professional.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft deliverables, and final deliverables to the interested consulting parties for review.

b. Scholarships and Training for [redacted] Resource Stewardship

1) Revolution Wind will fund scholarships and fees for professional training or certification programs in the fields of Astronomy, Archaeology/Anthropology, Marine Sciences, Aquaculture, Marine Fisheries, Marine Construction, Native American Studies, Ethnohistory, History, Biology, and related fields as described in Attachment 8.

2) Revolution Wind will have the documentation prepared by professionals with demonstrated experience in education and training program management and fiscal reporting.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, executed contracts between the implementing party and selected consultants, draft Scholarship Program Proposal, and final Scholarship Program Proposal to the interested consulting parties for review.

c. Coastal Resilience and Habitat Restoration

1) Revolution Wind will provide funding for planning and implementation of targeted efforts to mitigate future losses of character defining features and contributing resources for the TCP, support economically sustainable [redacted] practices, and documentation and/or recover of threatened elements of cultural sites associated with the TCP as described in Attachment 8.

2) Revolution Wind will have the documentation prepared by professionals with demonstrated experience in archaeology, habitat restoration, coastal resilience planning program management and fiscal reporting, as appropriate to the specific funded- activities. All archaeological surveys or other subsurface terrestrial investigations on any land owned or controlled by the Commonwealth of Massachusetts, its agencies or political subdivisions or on any historical or archeological landmarks or on any lands restricted by Massachusetts General Law (MGL) c. 184, § 31 will be conducted in accordance MHC regulations (950 CMR 70).

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft deliverables, and final deliverables to the interested consulting parties for review.

d. Archaeological and Cultural Sites Data Compilation

1) Revolution Wind will fund updated inventories of archaeological and cultural resource data pertaining to the TCP and the preparation of updated historic contexts for the interpretation of such resources as described in Attachment 8.

2) Revolution Wind will have the updated inventory prepared by professionals meeting the Secretary of the Interior's professional qualification standards in archeology and/or history (36 CFR 60) and in direct consultation with each participating Tribal Nation.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft and final historic context(s) and MHC inventory forms; and open source GIS database to the interested consulting parties for review.

e. Maritime Cultural Landscapes & Interconnected Contexts

1) Revolution Wind will fund a publicly-available and inclusive synthesis of information and knowledge about the maritime cultural landscapes along the shores, coastal islands, and waters of southern New England and Long Island as described in Attachment 8.

2) Revolution Wind will have the documentation prepared by professionals meeting the Secretary of the Interior's professional qualification standards in cultural anthropology, archeology, and/or history (36 CFR 60) and in direct consultation with each of the consulting Tribe's Tribal Historic Preservation Office or other designated tribal representative.

3) Revolution Wind will submit the RFP, consultant bids in response to the RFP, draft and final reports, and open-source GIS database to the interested consulting parties for review.

iii. Town of Dartmouth, Bristol County, Massachusetts*: Salter's Point*. BOEM will include the following as described in Attachment 9 (Historic Properties Treatment Plan for the Revolution Wind Farm: Salter's Point, Town of Dartmouth, Bristol County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 9.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

b. Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

iv. Town of Fairhaven, Bristol County, Massachusetts: *744 Sconticut Neck Road.* BOEM will include the following as described in Attachment 10 (Historic Properties Treatment Plan for the Revolution Wind Farm: 744 Sconticut Neck Road, Town of Fairhaven, Bristol County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 10.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

b. Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

v. Town of New Bedford, Bristol County, Massachusetts: *The Fort Taber Historic District and the Fort Rodman Historic District*. BOEM will include the following as described in Attachment 11 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Fort Taber Historic District and the Fort Rodman Historic District, Town of New Bedford, Bristol County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Implementation of Rehabilitation Plans and/or Universal Access

1) Revolution Wind will fund the next phase of the 2013 Architectural/Structural Assessment & Feasibility Study for Universal Access, which includes a conditions assessment and recommendations for repairs and rehabilitation of these two historic properties as described in Attachment 11.

2) Revolution Wind will develop the project consistent with the Town of New Bedford Historical Commission; Town of New Bedford Planning and Zoning; and the SOI Standards for Treatment of Historic Properties (36 CFR 68).

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft plans and specifications, final plans and specifications, and as-built documentation and photography, as applicable, to the interested consulting parties for review.

vi. Town of Westport, Bristol County, Massachusetts: *The Gooseberry Neck Observation Towers, the Gooseneck Causeway, the Westport Harbor Historic District, the Westport Point Historic District, the Westport Point Local Historic District, Westport Point Revolutionary War Properties, Horseneck Point Lifesaving Station, and Clam Shack Restaurant*. BOEM will include the following as described in Attachment 12 (Historic Properties Treatment Plan for the Revolution Wind Farm: Seven Historic Properties, Town of Westport, Bristol County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Maritime Infrastructure Survey

1) Revolution Wind will provide funding to survey and document maritime heritage resources including historic wharves, docks, buildings, and other infrastructure associated with historic properties identified in the HPTP as described in Attachment 12.

2) Revolution Wind will develop the project consistent with the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); the SOI Standards and Guidelines – Professional Qualifications Standards for Archaeology, History, Architectural History and/or Architecture (62 FR 33708); Massachusetts Historical Commission guidance; the Town of Westport's Community Preservation Commission's guidance, as applicable; and the Town of Westport's Cultural Council's guidance, as applicable.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, preliminary draft deliverables, and final deliverables to the interested consulting parties for review.

b. Adaptive Use Guidance

1) Revolution Wind will use fund the development of appropriate guidance on the preservation and adaptive use of historic wharves, docks, and buildings within the Westport Harbor and Westport Point historic district using the information developed from the Historic Maritime Infrastructure Survey as described in Attachment 12.

2) Revolution Wind will develop the project consistent with Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Guidelines for Architectural and Engineering Documentation; the Town of Westport's Building Department guidance and regulations, as applicable; the Town of Westport's Community Preservation Commission's guidance, as applicable; and the Town of Westport's Cultural Council's guidance, as applicable.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, preliminary draft deliverables, and final deliverables to the interested consulting parties for review.

vii. Town of Aquinnah, Dukes County, Massachusetts: *71 Moshup Trail, Leonard Vanderhoop House, Edwin DeVries Vanderhoop Homestead, Tom Cooper House,*

Theodore Haskins House, 3 Windy Hill Drive, Gay Head – Aquinnah Town Center Historic District, Gay Head – Aquinnah Shops, Gay Head – Aquinnah Coast Guard Station Barracks. BOEM will include the following as described in Attachment 13 (Historic Properties Treatment Plan for the Revolution Wind Farm, Nine Historic Properties, Town of Aquinnah, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Funding for Historic Preservation and Climate Adaptation Planning

1) Revolution Wind will fund and conduct a historic preservation and climate adaptation planning project to help preserve the character and setting of historic properties within the Town of Aquinnah while addressing anticipated threats to historic resources and their setting from climate change as described in Attachment 13.

2) Revolution Wind will develop the project consistent with the SOI Standards for Treatment of Historic Properties (36 CFR 68); Martha's Vineyard Commission's planning and climate change guidance, as applicable; Town of Aquinnah Community Preservation Committee guidance, as applicable; Town of Aquinnah Planning Bard Review Committee guidance, as applicable; and Town of Aquinnah Energy and Climate Committee guidance, as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photography and documentation (e.g., mapping), preliminary draft of the historic preservation and climate adaptation plan, including photographs and maps, and final plans to the interested consulting parties for review.

b. Funding for Energy Efficiency Improvements to the Town Hall.

1) Revolution Wind will fund energy efficiency improvements to the Aquinnah Town Hall to help to increase the energy efficiency and to help ensure the long-term preservation of this historic property as described in Attachment 13.

2) Revolution Wind will develop the project consistent with the Town of Aquinnah Building Code, as applicable; the Town of Aquinnah Energy and Climate Committee guidance, as applicable; the SOI Standards for Rehabilitation (36 CFR 67.7); and National Park Service's Improving Energy Efficiency in Historic Buildings Preservation Brief 3.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft plans and specifications, final plans and specifications, and as-built documentation including photographs to the interested consulting parties for review.

c. Complete Identified Needs from the Americans with Disabilities Act (ADA) Compliance Plan.

1) Revolution Wind will fund and complete the next phase of work identified in the proposed ADA Compliance Plan for the Aquinnah Circle and the Gay

Head – Aquinnah Shops Area to ensure all visitors are able to access and enjoy the Gay Head – Aquinnah Shops as described in Attachment 13.

2) Revolution Wind will develop the project consistent with Town of Aquinnah, MA Building Code, as applicable; Martha's Vineyard regulations; Commission's planning guidance, as applicable; ADA; the Massachusetts Office on Disability Guidelines as applicable; and the SOI Standards and Guidelines for Rehabilitation (36 CFR 68).

3) Revolution Wind will submit photographs and documentation of existing conditions, a RFP, proposals by qualified consultants in response to the RFP, preliminary draft of the construction plans including schedule, cost, and specifications, and final construction plan to the interested consulting parties for review.

viii. Town of Aquinnah, Dukes County, Massachusetts: *The Gay Head Lighthouse*. BOEM will include the following as described in Attachment 14 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Gay Head Lighthouse, Town of Aquinnah, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Rehabilitation of the Gay Head Lighthouse

1) Revolution Wind will fund and conduct the next phase of rehabilitation at the Gay Head Lighthouse to ensure the long-term preservation of the lighthouse by completing physical repairs and/or rehabilitation of the historic building materials as described in Attachment 14.

2) Revolution Wind will develop the project consistent with the Town of Aquinnah, MA Building Code; Martha's Vineyard Commission planning guidance, as applicable; Preservation Restriction (MGL Chapter 184, Section 31-33); United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005); the Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations; the Town of New Shoreham Historic District Commission; United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005); Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings; National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation; Historic Lighthouse Preservation Handbook; IALA-AISM Lighthouse Conservation Manual; Preservation Restriction (RIGL Title 42, Section 42-45-9); the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable; the SOI Standards for Treatment of Historic Properties (36 CFR 68); and the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable.

3) Revolution Wind will submit proposed scopes of work including draft text, project plans, and design specifications; photographic and written documentation of existing conditions; draft specifications and construction drawings; final Specifications and construction drawings; and a Summary Report of the work completed to the interested consulting parties for review.

ix. Town of Chilmark, Dukes County, Massachusetts*: Capt. Samuel Hancock – Capt. West Mitchell House, Russell Hancock House, Ernest Flanders House, Barn, and Shop, Simon Mayhew House, and Flaghole*. BOEM will include the following as described in Attachment 15 (Historic Properties Treatment Plan for the Revolution Wind Farm: Capt. Samuel Hancock – Capt. West Mitchell House, Russell Hancock House, Ernest Flanders House, Barn, and Shop, Simon Mayhew House, and Flaghole, Town of Chilmark, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Hazard Mitigation Plan for Historic Properties

1) Revolution Wind will fund and develop a hazard mitigation plan for the five historic properties identified in Attachment 15 to provide funding that will assist the Town of Chilmark to "protect and preserve irreplaceable cultural resources from the threats posed by flooding, storm damage, and fire as described in Attachment 15.

2) Revolution Wind will develop the project consistent with the Town of Chilmark Planning Commission guidance, as applicable; the Town of Chilmark Community Preservation Commission guidance, as applicable; the Town of Chilmark Historical Commission guidance, as applicable; Martha's Vineyard Commission planning guidance, as applicable; SOI Standards for Guidance on the Identification of Historic Properties (36 CFR 800.4), and SOI Professional Qualification Standards (36 CFR 61), as applicable.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, photography and documentation of existing conditions, draft updated historic property inventory if required, final updated historic property inventory if required, draft hazard mitigation plan, and final hazard mitigation plan to the interested consulting parties for review.

x. Town of West Tisbury, Dukes County, Massachusetts*: The Scrubby Neck Schoolhouse*. BOEM will include the following as described in Attachment 16 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Scrubby Neck Schoolhouse, Town of West Tisbury, Dukes County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Schoolhouse Conditions Assessment and Feasibility Plan

1) Revolution Wind will fund a conditions assessment and adaptive reuse plan to ensure the long-term use and preservation of the building as described in Attachment 16.

2) Revolution Wind will develop the project consistent with the Town of West Tisbury Building Department guidance and regulations, as applicable; Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; the SOI Standards for Treatment of Historic Properties (36 CFR 68); and the National Park Service's Guidelines for Architectural and Engineering Documentation.

3) Revolution Wind will submit a RFP; proposals by qualified consultants in response to the RFP; photography and documentation (e.g., mapping); preliminary draft of the Conditions Assessment and Feasibility Plan; and final conditions assessment and feasibility plan to the interested consulting parties for review.

xi. City of Newport, Newport County, Rhode Island: *The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill, the Ochre Point – Cliffs Historic District, and the Ocean Drive Historic District NHL*. BOEM will include the following as described in Attachment 17 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill, the Ochre Point – Cliffs Historic District, and the Ocean Drive Historic District National Historic Landmark, City of Newport, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Property Owner Guidebook

1) Revolution Wind will provide funding to update the existing Standards and Guidelines for the Newport Local Historic District with a focus on climate change, resiliency planning, and energy efficiency. in historic buildings as described in Attachment 17.

2) Revolution Wind will develop the project consistent with the SOI Standards and Guidelines for Treatment of Historic Properties (36 CFR 68); the National Park Service's Creating and Using Design Guidelines; the 2017 City of Newport's Comprehensive Land Use Plan; the City of Newport, Rhode Island Natural Hazard Mitigation Plan; the City of Newport Building, Zoning, and Inspections; and the City of Newport Historic District Commission.

3) Revolution Wind will submit a RFP, consultant bids in response to a RFP, draft Historic Property Owner Guidebook, and Historic Property Owner Guidebook to the interested consulting parties for review.

b. Stormwater Drainage Improvement Plans for the Historic Districts

1) Revolution Wind will provide funding to develop plans to improve overall stormwater drainage for the historic districts and create areas of permeable surfaces to decrease the likelihood of flooding occurring in and around historic properties as described in Attachment 17.

2) Revolution Wind will develop the project consistent with the U.S. Environmental Protection Agency guidance and regulations, as applicable; the SOI Standards and Guidelines for Treatment of Historic Properties (36 CFR 68.3); the National Park Service's Creating and Using Design Guidelines; the

2017 City of Newport's Comprehensive Land Use Plan; the City of Newport, Rhode Island Natural Hazard Mitigation Plan; the City of Newport Department of Utilities guidance and regulations, as applicable; the City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable; the City of Newport Historic District Commission guidance and regulations, as applicable; and the City of Newport Historic Department of Planning & Economic Development guidance and regulations, as applicable; the City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photography and documentation of existing conditions; preliminary stormwater management plans; and final stormwater management plans to the interested consulting parties for review.

xii. City of Newport, Newport County, Rhode Island: *The Bellevue Avenue Historic District NHL, Rosecliff, The Breakers NHL, and Marble House NHL*. BOEM will include the following as described in Attachment 18 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Bellevue Avenue Historic District, Rosecliff, The Breakers, and Marble House, City of Newport, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. National Register of Historic Places Nomination for the Cliff Walk

1) Revolution Wind will provide funding to officially document the history and significance of the Cliff Walk as an individual historic property as described in Attachment 18. The Cliff Walk is a publicly accessible walkway that intersects the Bellevue Avenue Historic District and various other historic properties along the Newport shore, including at The Breakers, Rosecliff, and Marble House.

2) Revolution Wind will develop the project consistent with the City of Newport Historic District Commission standards; the City of Newport Historic District Zoning, Chapter 17.80; the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); the SOI Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture (62 FR 33708); National Park Service's National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation; National Register Bulletin 16a: How to Complete the National Register Registration Form (NPS, 1997b); and RIHPHC guidance.

3) Revolution Wind will submit the RFP, proposals by qualified consults in response to the RFP, preliminary draft of the NRHP nomination form, and revised draft of the NRHP nomination form to the interested consulting parties for review.

b. Development of a Resiliency Plan for the Cliff Walk

1) Revolution Wind will provide funding to support the City of Newport's existing initiative to prepare a Resiliency Plan (or similar) to develop

measures that can be taken to maintain the setting and character of the Cliff Walk and ensure its long-term preservation as described in Attachment 18.

2) Revolution Wind will develop the project consistent with the SOI Standards for Treatment of Historic Properties (36 CFR 68); the 2017 City of Newport's Comprehensive Land Use Plan; the City of Newport, Rhode Island Natural Hazard Mitigation Plan; the City of Newport Department of Utilities guidance and regulations, as applicable; the City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable; the City of Newport Historic District Commission guidance and regulations, as applicable; and the City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable.

3) Revolution Wind will submit the RFP, preliminary draft of the Resiliency Plan; and Final Revised Resiliency Plan to the interested consulting parties for review.

c. Support On-Going Maintenance and Aesthetic Improvements to the Cliff Walk

1) Revolution Wind will provide funding for the implementation of resiliency measures, on-going maintenance, and/or aesthetic improvements to the Cliff Walk to ensure the long-term preservation of this historic resource as described in Attachment 18.

2) Revolution Wind will develop the project consistent with the Newport Cliff Walk Commission; the City of Newport Building, Zoning, and Inspections; the City of Newport Historic District Commission; and the SOI Standards for Treatment of Historic Properties (36 CFR 68).

3) Revolution Wind will determine the appropriate supporting documentation in consultation with the interested consulting parties and allow them to review draft and final documents.

d. Development of an Invasive Species Management Plan

1) Revolution Wind will provide funding to provide an invasive species vegetation management plan for the historic properties of the City of Newport, with a focus on management of invasive species that threaten the historic character and ecology of the Cliff Walk as described in Attachment 18.

2) Revolution Wind will develop the project consistent with Preservation Brief #36: Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes (Birnbaum, 1994); the Alliance for Historic Landscape Preservation guidance, as applicable; the City of Newport Historic District Commission guidance and regulations, as applicable; the City of Newport Department of Planning & Economic Development guidance and regulations, as applicable; and the SOI Standards for Treatment of Historic Properties (36 CFR 68).

3) Revolution Wind will submit the RFP, proposals by qualified consults in response to the RFP; draft vegetation management plan; and final vegetation management plan to the interested consulting parties for review.

e. Volunteer Ambassador Program

1) Revolution Wind will provide funding to assist the Newport Cliff Walk Commission with the development of the Volunteer Ambassador Program as described in Attachment 18.

2) Revolution Wind will develop the project consistent with Preservation Brief #36: Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes, as applicable (Birnbaum, 1994); the Alliance for Historic Landscape Preservation guidance, as applicable; the City of Newport Historic District Commission guidance and regulations, as applicable; the City of Newport Department of Planning & Economic Development guidance and regulations, as applicable; and the SOI Standards for Treatment of Historic Properties (36 CFR 68).

3) Revolution Wind will submit the RFP, identified program needs, and program support plan to the interested consulting parties for review.

f. Mobile Application

1) Revolution Wind will provide funding to undertake upgrades or additional content for the existing "Cliff Walk" mobile application developed by the City of Newport in 2015, or to create a new mobile app for the Cliff Walk as described in Attachment 18.

2) Revolution Wind will develop the project consistent with applicable standards for mobile application development.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, preliminary design of the application, and final application design to the interested consulting parties for review.

xiii. Town of Jamestown, Newport County, Rhode Island: *Horsehead/Marabella*. BOEM will include the following as described in Attachment 19 (Historic Properties Treatment Plan for the Revolution Wind Farm: Horsehead/Marabella, Town of Jamestown, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic American Building Survey (HABS) Documentation

1) Revolution Wind will provide funding to document historic architecture through measured drawings, photography, and historical narratives as described in Attachment 19.

2) Revolution Wind will develop the project consistent with HABS Guidelines, the Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4), and the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft documentation, and final HABS documentation for RI SHPO review.

xiv. Town of Little Compton, Newport County, Rhode Island: *The Abbott Phillips House, the Stone House Inn, the Warren's Point Historic District, and Tunipus Goosewing Farm*. BOEM will include the following as described in Attachment 20 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Abbott Phillips House, the Stone House Inn, and the Warren's Point Historic District, and Tunipus Goosewing Farm, Town of Little Compton, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Climate Adaptation and Sustainability Plan for Historic Properties

1) Revolution Wind will provide funding to develop a climate adaptation and sustainability plan for the Abbott Phillips House, the Stone House Inn, the Warren's Point Historic District, and Tunipus Goosewing Farm to assist with the long-term preservation of the historic properties in the Town of Little Compton while addressing anticipated threats to historic resources and their setting from climate change as described in Attachment 20.

2) Revolution Wind will develop the project consistent with the SOI Standards for Treatment of Historic Properties (36 CFR 68); the 2018 Town of Little Compton, Rhode Island Local Hazard Mitigation Plan; the 2018 Town of Little Compton Rhode Island Comprehensive Plan; Town of Little Compton Planning Board guidance and regulations, as applicable; and Town of Little Compton Conservation Commission guidance and regulations, as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft hazard mitigation plan, and final hazard mitigation plan to the interested consulting parties for review.

b. Development of an Interpretive Exhibit/Signage at Goosewing Beach

1) Revolution Wind will use the information developed in the Climate Adaptation and Sustainability Plan to provide public education materials as described in Attachment 20.

2) Revolution Wind will develop the project consistent with the Town of Little Compton Zoning Official guidance, as applicable; the National Park Service's Wayside Exhibits: A Guide to Developing Outdoor Interpretive Exhibits, as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft hazard mitigation plan, and final hazard mitigation plan to the interested consulting parties for review.

c. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 20.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

xv. Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review. Town of Middletown, Newport County, Rhode Island: *The Bailey Farm, the Clambake Club of Newport, Paradise Rocks Historic District, Sea View Villa, St. Georges School, the Indian Avenue Historic District, Whetstone, the Land Trust Cottages, and the Bluff/John Bancroft Estate*. BOEM will include the following as described in Attachment 21 (Historic Properties Treatment Plan for the Revolution Wind Farm: Nine Historic Properties, Town of Middletown, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Development of a Coastal/Shoreline Resiliency and Climate Adaptation Plan for Historic Properties

1) Revolution Wind will provide funding to develop a coastal/shoreline resiliency and climate adaptation plan for the eight historic properties identified in Attachment 21 to provide the Town and historic property owners with specific measures that can be taken to protect their historic properties from flooding, coastal erosion, and other climate related threats as described in Attachment 21.

2) Revolution Wind will develop the project consistent with Town of Middletown Planning Regulations; Current Climate Adaptation, Resiliency, and related guidance; the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); and the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft updated historic property inventory if required, final updated historic property inventory if required, draft Coastal/Shoreline Resiliency and Climate Adaptation Plan, and final Coastal/Shoreline Resiliency and Climate Adaptation Plan to the interested consulting parties for review.

b. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 21.

2) Revolution Wind will develop the project consistent with the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

xvi. Town of Tiverton, Newport County, Rhode Island*: Puncatest Neck Historic District.* BOEM will include the following as described in Attachment 22 (Historic Properties Treatment Plan for the Revolution Wind Farm: Nine Historic Properties, Town of Tiverton, Newport County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 22.

2) Revolution Wind will develop the project consistent with the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

xvii. Town of Narragansett, Washington County, Rhode Island*: Dunmere, the Ocean Road Historic District, the Towers Historic District, the Towers (and Narragansett Casino Entrance), the Life Saving Station at Narragansett Pier, Fort Varnum/Camp Varnum, Narragansett Pier MRA, the Dunes Club*. BOEM will include the following as described in Attachment 23 (Historic Properties Treatment Plan for the Revolution Wind Farm: Eight Historic Properties, Town of Narragansett, Washington County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Ocean Road Seawall Assessment

1) Revolution Wind will provide funding to complete a study to determine an implementation plan to preserve the Ocean Road Seawall as described in Attachment 23. The intended outcome is to provide funding to assess the Ocean Road seawall and prioritize repairs and improvements that would enhance protection of the Ocean Road Historic District and preserve the character of existing historic shoreline settings.

2) Revolution Wind will develop the project consistent with the Town of Narragansett Code of Ordinances Chapter No. 1081 Buildings and Building Regulations.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft plan and final plan to the interested consulting parties for review.

b. National Register of Historic Places Nomination for Fort Varnum/Camp Varnum

1) Revolution Wind will provide funding to officially document the history and significance of Fort Varnum/Camp Varnum and the role the property played in the defense of the eastern seaboard during World War II, as well as the role it continues to play in defense of the United States as described in Attachment 23.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4), the Secretary of the Interior's Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture (62 FR 33708), National Park Service's National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation, National Register Bulletin 16a: How to Complete the National Register Registration Form, and RIHPHC guidance.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, Preliminary Draft of the NRHP Nomination Form, and Revised draft of the NRHP Nomination Form to the interested consulting parties for review.

c. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 23.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

xviii. Town of New Shoreham, Washington County, Rhode Island: *The Block Island Southeast Lighthouse NHL*. BOEM will include the following as described in Attachment 24 (Historic Properties Treatment Plan for the Revolution Wind Farm: the Block Island Southeast Lighthouse, National Historic Landmark, Town of New Shoreham, Washington County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Cyclical Maintenance Activities and Restoration

1) Revolution Wind will provide funding for the implementation of cyclical maintenance and restoration activities as identified in the cyclical maintenance plan at the Block Island Southeast Lighthouse NHL as described in Attachment 24.

2) Revolution Wind will develop the project consistent with the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); the Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations, as applicable; and the Town of New Shoreham Historic District Commission guidance and regulations, as applicable; the Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations; the Town of New Shoreham Historic District Commission; United States Coast Guard Aid to Navigation (ATON) Access Easement; Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings; National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation; Historic Lighthouse Preservation Handbook; IALA-AISM Lighthouse Conservation Manual; Preservation Restriction (RIGL Title 42, Section 42-45-9); the SOI Standards for Treatment of Historic Properties (36 CFR 68); and the SOI Professional Qualifications Standards (36 CFR Part 61), as applicable.

3) Revolution Wind will submit the RFP, proposals by qualified consultants in response to the RFP, existing condition documentation including photographs, draft plans and specifications, if applicable; final plans and specifications, if applicable; as-built documentation, including photographs; and other documentation, as required, to the interested consulting parties for review.

xix. Town of New Shoreham, Washington County, Rhode Island*: The Old Harbor Historic District, New Shoreham Historic District, the Corn Neck Road Historic District, the Indian Head Neck Road Historic District, the Hippocampus/Boy's camp/Beane Family, the Mitchell Farm, the U.S. Lifesaving Station, the U.S. Coast Guard Brick House, the U.S. Weather Bureau Station, the Hygeia House, the Peleg Champlin House, the Beach Avenue Historic District, the Lakeside Drive and Mitchell Lane Historic District, the Nathan Mott Park, the Champlin Farm Historic District, Island Cemetery/Old Burial Ground, the Old Town and Center Roads Historic District, the Beacon Hill Road Historic District, the Mohegan Cottage, the Lewis Farm and Dickens Farm Historic District, the Miss Abby E. Vaill/1 of 2 Vaill Cottages, the Hon. Julius Deming Perkins/"Bayberry Lodge," Spring Street Historic District, the Caleb W. Dodge Jr. House, the Captain Mark L. Potter House, , the Captain Welcome Dodge Sr. House, the Pilot Hill and Seaweed Lane Historic District, Spring Cottage, the Spring House Hotel, the WWII Lookout Tower at Sands Pond, and the WWII Lookout Tower-Spring Street.* BOEM will include the following as described in Attachment 25 (Historic Properties Treatment Plan for the Revolution Wind Farm: Thirty-One Historic Properties, Town of New Shoreham, Washington County, Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Development and Implementation of the Coastal Resiliency Plan

1) Revolution Wind will provide funding to develop and implement a Coastal Resiliency Plan to protect the coastal historic properties and associated historic settings in New Shoreham as described in Attachment 25.

2) Revolution Wind will develop the project consistent with the SOI Standards for Treatment of Historic Properties (36 CFR 68); the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); the Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations, as applicable; and the Town of New Shoreham Historic District Commission guidance and regulations, as applicable.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft plan, final plan, and as-built documentation to the interested consulting parties for review.

b. Town-wide National Register of Historic Places Nomination

1) Revolution Wind will provide funding to recognize and document the historic and cultural significance in New Shoreham by completing NRHP Nomination for the entire Town of New Shoreham as described in Attachment 25.

2) Revolution Wind will develop the project consistent with the SOI Guidance on the Identification of Historic Properties (36 CFR 800.4); SOI Professional Qualification Standards (36 CFR 61); the National Park Service's (NPS) National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation, as applicable (NPS, 1997a); National Register Bulletin 16a: How to Complete the National Register Registration Form (NPS, 1997b); and RIHPHC guidance.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft of the NRHP Nomination Form; and revised draft of the NRHP Nomination Form to the interested consulting parties for review.

xx. Town of South Kingstown, Washington County, Rhode Island*: The Brownings Beach Historic District.* BOEM will include the following as described in Attachment 26 (Historic Properties Treatment Plan for the Revolution Wind Farm: The Brownings Beach Historic District, Town of South Kingstown, Washington County, Massachusetts) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Historic Context for Summer Cottage/Resort Development

1) Revolution Wind will provide funding to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries as described in Attachment 26.

2) Revolution Wind will develop the project consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), as applicable, RIHPHC guidance, and MHC guidance.

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, preliminary draft report, and final report to the interested consulting parties for review.

xxi. Massachusetts and Rhode Island*: Sakonnet Light Station, the Block Island North Lighthouse, the Point Judith Lighthouse, the Beavertail Light, the Tarpaulin Cove Light, the Clark's Point Light, the Butler Flats Light Station, and the Nobska Point Lighthouse.* BOEM will include the following as described in Attachment 27 (Historic Properties Treatment Plan for the Revolution Wind Farm: Eight Historic Lighthouses, Massachusetts and Rhode Island) as conditions of approval of the Revolution Wind COP. Revolution Wind will fund and commence the following prior to initiation of construction of any offshore project elements on the OCS included as part of this undertaking.

a. Assessment, Planning, Restoration, and Institutional Development

1) Revolution Wind will provide funding to support the prioritized needs of each of the eight lighthouses to enhance the long-term preservation, resiliency, and interpretation of the historic properties and will help preserve the character of existing historic shoreline settings as described in Attachment 27.

2) Revolution Wind will develop the project consistent with the applicable state and local building codes, guidance and regulations; all existing preservation restrictions and/or easements; Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character; Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings; National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation; Historic Lighthouse Preservation Handbook; IALA-AISM Lighthouse Conservation Manual; SOI Professional Qualification Standards (36 CFR 61), as applicable; and the SOI Standards for Treatment of Historic Properties (36 CFR 68).

3) Revolution Wind will submit a RFP, proposals by qualified consultants in response to the RFP, photographs and documentation of existing conditions, draft deliverables, final deliverables, and as-built documentation and photography to the interested consulting parties for review.

IV. PROJECT MODIFICATIONS

A. If Revolution Wind proposes any modifications to the Project that expands the Project beyond the Project Design Envelope included in the COP and/or occurs outside the defined APEs or the proposed modifications change BOEM's final Section 106 determinations and findings for this Project, Revolution Wind shall notify and provide BOEM with information concerning the proposed modifications. BOEM will determine if these modifications require alteration of the conclusions reached in the Finding of Effect and, thus, will require additional consultation with the signatories, invited signatories and consulting parties. If BOEM determines additional consultation is required, Revolution Wind will provide the signatories, invited signatories, and

consulting parties with the information concerning the proposed changes, and they will have 30 calendar days from receipt of this information to comment on the proposed changes. BOEM shall take into account any comments from signatories, invited signatories, and consulting parties prior to agreeing to any proposed changes. Using the procedure below, BOEM will, as necessary, consult with the signatories, invited signatories, and consulting parties to identify and evaluate historic properties in any newly affected areas, assess the effects of the modification, and resolve any adverse effects.

1. If the Project is modified and BOEM identifies no additional historic properties or determines that no historic properties are adversely affected due to the modification, BOEM, with the assistance of Revolution Wind, will notify and consult with the signatories, invited signatories, and consulting parties following the consultation process set forth in this Stipulation IV.A.1.

    i. Revolution Wind will notify all the signatories, invited signatories, and consulting parties about this proposed change and BOEM's determination by providing a written summary of the project modification including any maps, a summary of any additional surveys and/or research conducted to identify historic properties and assess effects, and copies of the surveys.

    ii. BOEM and Revolution Wind will allow the signatories, invited signatories, and consulting parties 30 calendar days to review and comment on the proposed change, BOEM's determination, and the documents.

    iii. After the 30-calendar review period has concluded and no comments require additional consultation, Revolution Wind will notify the signatories and consulting parties that BOEM has approved the project modification and, if they received any comments, provide a summary of the comments and BOEM's responses.

    iv. BOEM, with the assistance of Revolution Wind, will conduct any consultation meetings if requested by the signatories or consulting parties.

    v. This MOA will not need to be amended if no additional historic properties are identified and/or adversely affected.

2. If BOEM determines new adverse effects to historic properties will occur due to a Project modification, BOEM with the assistance of Revolution Wind will notify and consult with the signatories, invited signatories, and consulting parties regarding BOEM's finding and the proposed measures to resolve the adverse effect(s) including the development of a new treatment plan(s) following the consultation process set forth in this Stipulation IV.A. 2.

    i. Revolution Wind will notify all signatories, invited signatories, and consulting parties about this proposed modification, BOEM's determination, and the proposed resolution measures for the adverse effect(s).

    ii. The signatories, invited signatories, and consulting parties will have 30 calendar days to review and comment on the adverse effect finding and the proposed resolution of adverse effect(s), including a draft treatment plan(s).

    iii. BOEM, with the assistance of Revolution Wind, will conduct additional consultation meetings, if necessary, during consultation on the adverse effect finding and during drafting and finalization of the treatment plan(s).

iv. BOEM, with the assistance of Revolution Wind, will respond to the comments and make necessary edits to the documents.

v. Revolution Wind will send the revised draft final documents to the other signatories, invited signatories, and consulting parties for review and comment during a 30-calendar day review and comment period. With this same submittal of draft final documents, Revolution Wind will provide a summary of all the comments received on the documents and BOEM's responses.

vi. BOEM, with the assistance of Revolution Wind, will respond to the comments on the draft final documents and make necessary edits to the documents.

vii. Revolution Wind will notify all the signatories, invited signatories, and consulting parties that BOEM has approved the project modification and will provide the final document(s) including the final treatment plan(s) and a summary of comments and BOEM's responses to comments, if they receive any on the draft final documents, after BOEM has received concurrence from the appropriate SHPO(s) on the finding of new adverse effect(s), BOEM has accepted the final treatment plan(s), and BOEM has approved the Project modification.

viii. The MOA will not need to be amended after the treatment plan(s) is accepted by BOEM.

3. If any of the signatories, invited signatories, or consulting parties object to determinations, findings, or resolutions made pursuant to these measures (Stipulation IV.A.1 and 2), BOEM will resolve any such objections pursuant to the dispute resolution process set forth in Stipulation XI.

V. REVIEW PROCESS FOR DOCUMENTS

A. The following process will be used for any document, report, or plan produced in accordance with Stipulations I through IV of this PA:

1. Draft Document

i. Revolution Wind shall provide the document to BOEM for technical review and approval

a. BOEM has 15 calendar days to complete its technical review.

b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

ii. BOEM, with the assistance of Revolution Wind, shall provide the draft document to consulting parties, except the ACHP, for review and comment.

a. Consulting parties shall have 30 calendar days to review and comment.

b. BOEM, with the assistance of Revolution Wind, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

c. BOEM shall consolidate comments received and provide them to Revolution Wind within 15 calendar days of receiving comments from consulting parties.

2. Draft Final Document

    i. Revolution Wind shall provide BOEM with the draft final document for technical review and approval

        a. BOEM has 15 calendar days to complete its technical review.

        b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

    ii. BOEM, with the assistance of Revolution Wind, shall provide the draft final document to consulting parties, except the ACHP, for review and comment

        a. Consulting parties have 30 calendar days to review and comment.

        b. BOEM, with the assistance of Revolution Wind, shall coordinate a meeting with consulting parties to facilitate comments on the document if requested by a consulting party.

        c. BOEM shall consolidate comments received and provide them to Revolution Wind within 15 calendar days of receiving comments from consulting parties.

3. Final Document

    i. Revolution Wind shall provide BOEM with the final document for approval.

        a. BOEM has 15 calendar days to complete its technical review.

        b. If BOEM does not provide approval, it shall submit its comments back to Revolution Wind, who will have 15 calendar days to address the comments.

        c. BOEM, with the assistance of Revolution Wind, shall provide the final document to consulting parties, except the ACHP, within 30 calendar days of approving the final document.

VI. SUBMISSION OF DOCUMENTS

A. Connecticut, Massachusetts, New York, and Rhode Island SHPOs, ACHP, NPS, Tribal Nations, and Consulting Parties.

1. All submittals to the Rhode Island, New York, and Connecticut SHPOs, ACHP, NPS, Tribal Nations, and consulting parties will be submitted electronically unless a specific request is made for the submittal be provided in paper format.

2. Massachusetts SHPO

    i. All submittals to the Massachusetts SHPO, if required for any HPTP, will be in paper format and delivered by U.S. Mail, delivery service, or by hand.

    ii. Plans and specifications submitted to the Massachusetts SHPO, if required for any HPTP, must measure no larger than 11- x 17-inch paper format (unless another format is agreed to in consultation); therefore, all documents produced that will be submitted to Massachusetts SHPO under this MOA, must meet this format.

VII. CURATION

A. Collections from federal lands or the OCS:

1. Any archaeological materials removed from federal lands or the OCS as a result of the actions required by this MOA shall be curated in accordance with 36 CFR 79, "Curation of Federally Owned and Administered Archaeological Collections," ACHP's "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" published in the Federal Register (64 Fed. Reg. 27085-27087 (May 18, 1999)), or other provisions agreed to by the consulting parties and following applicable State guidelines. No excavation should be initiated before acceptance and approval of a curation plan.

B. Collections from state, local government, and private lands:

1. Archaeological materials from state or local government lands in the APE and the records and documentation associated with these materials shall be curated within the state of their origin at a repository preferred by the SHPO, or an approved and certified repository, in accordance with the standards and guidelines required by the RI SHPO. Lands as described here may include the seafloor in state waters. No excavation should be initiated before acceptance and approval of a curation plan.

2. Collections from private lands that would remain private property: In cases where archaeological survey and testing are conducted on private land, any recovered collections remain the property of the land owner. In such instances, BOEM and Revolution Wind, in coordination with the SHPO, and affected Tribe(s), will encourage land owners to donate the collection(s) to an appropriate public or Tribal entity. To the extent a private landowner requests that the materials be removed from the site, Revolution Wind will seek to have the materials donated to the repository identified under Stipulation VII.B.1 through a written donation agreement developed in consultation with the consulting parties. BOEM, assisted by Revolution Wind, will seek to have all materials from each state curated together in the same curation facility within the state of origin. In cases where the property owner wishes to transfer ownership of the collection(s) to a public or Tribal entity, BOEM and Revolution Wind will ensure that recovered artifacts and related documentation are curated in a suitable repository as agreed to by BOEM, SHPO, and affected Tribe(s), and following applicable State guidelines. To the extent feasible, the materials and records resulting from the actions required by this MOA for private lands, shall be curated in accordance with 36 CFR 79. No excavation should be initiated before acceptance and approval of a curation plan.

VIII. PROFESSIONAL QUALIFICATIONS

A. Secretary's Standards for Archaeology and Historic Preservation. Revolution Wind will ensure that all work carried out pursuant to this MOA will meet the SOI Standards for Archaeology and Historic Preservation, 48 FR 44716 (September 29, 1983), taking into account the suggested approaches to new construction in the SOI's Standards for Rehabilitation.

B. SOI Professional Qualifications Standards. Revolution Wind will ensure that all work carried out pursuant to this MOA is performed by or under the direction supervision of historic preservation professionals who meet the SOI's Professional Qualifications Standards (48 FR 44738-44739). A "qualified professional" is a person who meets the relevant standards outlined in such SOI Standards. BOEM, or its designee, will ensure that consultants retained for services pursuant to the MOA meet these standards.

C. Investigations of ASLFs. Revolution Wind will ensure that the additional investigations of ASLFs will be conducted, and reports and other materials produced by one or more qualified marine archaeologists and geological specialists who meet the SOI's Professional Qualifications Standards and has experience both in conducting High Resolution Geophysical (HRG) surveys and processing and interpreting the resulting data for archaeological potential, as well as collecting, subsampling, and analyzing cores.

D. Tribal Consultation Experience. Revolution Wind will ensure that all work carried out pursuant to this MOA that requires consultation with Tribal Nations is performed by professionals who have demonstrated professional experience consulting with federally recognized Tribal Nations.

IX. DURATION

A. This MOA will expire at (1) the decommissioning of the Project in the lease area, as defined in Revolution Wind's lease with BOEM (Lease Number OCS-A 0486) or (2) 25-years from the date of COP approval, whichever occurs first. Prior to such time, BOEM may consult with the other signatories and invited signatories to reconsider the terms of the MOA and amend it in accordance with Amendment Stipulation (Stipulation XII).

X. POST-REVIEW DISCOVERIES

A. Implementation of Post-Review Discovery Plans. If properties are discovered that may be historically significant or unanticipated effects on historic properties found, BOEM shall implement the post-review discovery plans found in Attachments 28 (Revolution Wind Export Cable Onshore Substation and Interconnection Facility, North Kingstown, Rhode Island: Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains) and 29 (Unanticipated Discoveries Plan for Submerged Archaeological Sites, Historic Properties, and Cultural Resources Including Human Remains: Revolution Wind Farm for Lease Area OCS A-0486 Construction and Operations Plan).

1. The signatories acknowledge and agree that it is possible that additional historic properties may be discovered during implementation of the Project, despite the completion of a good faith effort to identify historic properties throughout the APEs.

B. All Post-Review Discoveries. In the event of a post-review discovery of a property or unanticipated effects to a historic property prior to or during construction, operation, maintenance, or decommissioning of the Project, Revolution Wind will implement the following actions which are consistent with the post-review discovery plan:

1. Immediately halt all ground- or seafloor-disturbing activities within the area of discovery while taking into account whether stabilization and further protections are warranted to keep the discovered resource from further degradation and impact;

2. Notify BOEM in writing via report within 72 hours of the discovery, including any recommendations on need and urgency of stabilization and additional protections for the discovered resource;

3. Keep the location of the discovery confidential and take no action that may adversely affect the discovered property until BOEM or its designee has made an evaluation and instructs Revolution Wind on how to proceed; and

4. Conduct any additional investigations as directed by BOEM or its designee to determine if the resource is eligible for listing in the NRHP (30 CFR 585.802(b)). BOEM will direct Revolution Wind to complete additional investigations, as BOEM deems appropriate, if:

i. the site has been impacted by Revolution Wind Project activities; or

ii. impacts to the site from Revolution Wind Project activities cannot be avoided.

5. If investigations indicate that the resource is eligible for the NRHP, BOEM, with the assistance of Revolution Wind, will work with the other relevant signatories, invited signatories, and consulting parties to this MOA who have a demonstrated interest in the affected historic property and on the further avoidance, minimization or mitigation of adverse effects.

6. If there is any evidence that the discovery is from an indigenous society or appears to be a preserved burial site, Revolution Wind will contact the Tribal Nations (Mashpee Wampanoag Tribe, Shinnecock Indian Nation, Mashantucket Pequot Tribal Nation, Wampanoag Tribe of Gay Head [Aquinnah], Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Delaware Tribe of Indians, The Delaware Nation) as identified in the notification lists included in the post-review discovery plans within 72 hours of the discovery with details of what is known about the discovery, and consult with the Tribal Nations pursuant to the post review discovery plan.

7. If BOEM incurs costs in addressing the discovery, under Section 110(g) of the NHPA, BOEM may charge Revolution Wind reasonable costs for carrying out historic preservation responsibilities, pursuant to its delegated authority under the OCS Lands Act (30 CFR 585.802 (c-d)).

XI. MONITORING AND REPORTING

At the beginning of each calendar year by January 31, following the execution of this MOA until it expires or is terminated, Revolution Wind will prepare and, following BOEM's review and agreement to share this summary report, provide all signatories, invited signatories, and consulting parties to this MOA a summary report detailing work undertaken pursuant to the MOA. Such report shall include a description of how the stipulations relating to avoidance, minimization, and mitigation measures (Stipulations I, II, and III) were implemented; any scheduling changes proposed; any problems encountered; and any disputes and objections received in BOEM's efforts to carry out the terms of this MOA. Revolution Wind can satisfy its reporting requirement under this stipulation by providing the relevant portions of the annual compliance certification required under 30 CFR 585.633.

XII. DISPUTE RESOLUTION

A. Should any signatory, invited signatory, or consulting party to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, they must notify BOEM in writing of their objection. BOEM shall consult with such party to resolve the objection. If BOEM determines that such objection cannot be resolved, BOEM will:

1. Forward all documentation relevant to the dispute, including the BOEM's proposed resolution, to the ACHP. The ACHP shall provide BOEM with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, BOEM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, invited signatories, and/or consulting parties, and provide them with a copy of this written response. BOEM will make a final decision and proceed accordingly.

2. If the ACHP does not provide its advice regarding the dispute within the 30 calendar-day time period, BOEM may make a final decision on the dispute and proceed accordingly. Prior

to reaching such a final decision, BOEM shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories, invited signatories, or consulting parties to the MOA, and provide them and the ACHP with a copy of such written response.

B. BOEM's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

C. At any time during the implementation of the measures stipulated in this MOA, should a member of the public object in writing to the signatories regarding the manner in which the measures stipulated in this MOA are being implemented, that signatory will notify BOEM. BOEM shall review the objection and may notify the other signatories as appropriate, and respond to the objector.

XIII. AMENDMENTS

A. This MOA may be amended when such an amendment is agreed to in writing by all signatories and invited signatories. The amendment will be effective on the date a copy signed by all of the signatories and invited signatories is filed with the ACHP.

B. Revisions to any attachment may be proposed by any signatory or invited signatory by submitting a draft of the proposed revisions to all signatories and invited signatories with a notification to the consulting parties. The signatories and invited signatories will consult for no more than 30 calendar days (or another time period agreed upon by all signatories and invited signatories) to consider the proposed revisions to the attachment. If the signatories and invited signatories unanimously agree to revise the attachment, Revolution Wind BOEM will provide a copy of the revised attachment to the other signatories, invited signatories, and consulting parties. Revisions to any attachment to this MOA will not require an amendment to the MOA.

XIV. TERMINATION

A. If any signatory or invited signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories, invited signatories, and consulting parties to attempt to develop an amendment per Stipulation XII. If within 30 calendar days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory or invited signatory may terminate the MOA upon written notification to the other signatories.

B. Once the MOA is terminated, and prior to work continuing on the undertaking, BOEM must either(a) execute an MOA pursuant to 36 CFR 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. BOEM shall notify the signatories and invited signatories as to the course of action it will pursue.

XV. COORDINATION WITH OTHER FEDERAL AGENCIES

A. In the event that another federal agency not initially a party to or subject to this MOA receives an application for funding/license/permit for the undertaking as described in this MOA, that agency may fulfill its Section 106 responsibilities by stating in writing it concurs with the terms of this MOA and notifying the signatories and invited signatories that it intends to do so. Such federal agency may become a signatory, invited signatory, or a concurring party (collectively referred to as signing party) to the MOA as a means of complying with its responsibilities under Section 106 and based on its level of involvement in the undertaking. To become a signing party to the MOA, the agency official must provide written notice to the signatories and invited signatories that the

agency agrees to the terms of the MOA, specifying the extent of the agency's intent to participate in the MOA. The participation of the agency is subject to approval by the signatories and invited signatories who must respond to the written notice within 30 calendar days, or the approval will be considered implicit. Any necessary amendments to the MOA as a result will be considered in accordance with the Amendment Stipulation (Stipulation XII).

B. Should the signatories and invited signatories approve the federal agency's request to be a signing party to this MOA, an amendment under Stipulation XII will not be necessary if the federal agency's participation does not change the undertaking in a manner that would require any modifications to the stipulations set forth in this MOA. BOEM will document these conditions and involvement of the federal agency in a written notification to the signatories, invited signatories, and consulting parties, and include a copy of the federal agency's executed signature page, which will codify the addition of the federal agency as a signing party in lieu of an amendment.

XVI. ANTI-DEFICIENCY ACT

A. Pursuant to 31 USC 1341(a)(1), nothing in this MOA will be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

B. Execution of this MOA by BOEM, the Connecticut, Massachusetts, New York, and Rhode Island SHPOs, and the ACHP, and implementation of its terms evidence that BOEM has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

[SIGNATURES COMMENCE ON FOLLOWING PAGE]

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

Bureau of Ocean Energy Management (BOEM)

_____ Date:_____

Amanda Lefton
Director
Bureau of Ocean Energy Management

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

Connecticut State Historic Preservation Officer (SHPO)

_____ Date:_____

Catherine Labadia
Deputy State Historic Preservation Officer
Connecticut State Historic Preservation Office

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

Rhode Island State Historic Preservation Officer (SHPO)

_____ Date:_____
Jeffrey Emidy
Interim Executive Director and State Historic Preservation Officer
Rhode Island Historical Preservation & Heritage Commission

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

New York State Historic Preservation Officer (SHPO)

_____ Date:_____
Roger Daniel Mackay
Deputy Commissioner New York State Division for Historic Preservation

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

Massachusetts State Historic Preservation Officer (SHPO)

_____ Date:_____

Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Signatory:

Advisory Council on Historic Preservation (ACHP)

_____ Date:_____

Reid J. Nelson
Acting Executive Director
Advisory Council on Historic Preservation

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Invited Signatory:

Revolution Wind, LLC

_____ Date:_____

Kellen Ingalls
Authorized Person
Revolution Wind, LLC

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Mashpee Wampanoag Tribe

_____ Date:_____

[Name]
[Title]
Mashpee Wampanoag Tribe

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Shinnecock Indian Nation

_____ Date:_____

[Name]
[Title]
Shinnecock Indian Nation

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Mashantucket Pequot Tribal Nation

_____ Date:_____

[Name]
[Title]
Mashantucket Pequot Tribal Nation

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Wampanoag Tribe of Gay Head (Aquinnah)

_____ Date:_____

[Name]
[Title]
Wampanoag Tribe of Gay Head (Aquinnah)

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Mohegan Tribe of Indians of Connecticut

_____ Date:_____

[Name]
[Title]
Mohegan Tribe of Indians of Connecticut

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Narragansett Indian Tribe

_____ Date:_____

[Name]
[Title]
Narragansett Indian Tribe

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

The Delaware Tribe of Indians

_____ Date:_____

[Name]
[Title]
The Delaware Tribe of Indians

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

The Delaware Nation

_____ Date:_____

[Name]
[Title]
The Delaware Nation

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

Concurring Party:

Organization

_____ Date:_____
Name
Title
Organization

DRAFT

MEMORANDUM OF AGREEMENT
AMONG THE BUREAU OF OCEAN ENERGY MANAGEMENT,
THE STATE HISTORIC PRESERVATION OFFICERS OF CONNECTICUT,
MASSACHUSETTS, NEW YORK, AND RHODE ISLAND,
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE REVOLUTION WIND OFFSHORE WIND FARM PROJECT

LIST OF ATTACHMENTS TO THE MOA

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ATTACHMENT 2 – APE MAPS

ATTACHMENT 3 – ABOVE GROUND HISTORIC PROPERTIES ADVERSELY AFFECTED BY THE PROJECT

ATTACHMENT 4 – LISTS OF INVITED AND PARTICIPATING CONSULTING PARTIES

ATTACHMENT 5 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM ANCIENT SUBMERGED LANDFORMS, OUTER CONTINENTAL SHELF, FEDERAL AND RHODE ISLAND WATERS OF RHODE ISLAND SOUND

ATTACHMENT 6 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM, THE [redacted] #1 AND #2 SITES, TOWN OF NORTH KINGSTOWN, WASHINGTON COUNTY, RHODE ISLAND

ATTACHMENT 7 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted], MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF

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ATTACHMENT 9 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: SALTER'S POINT, TOWN OF DARTMOUTH, BRISTOL COUNTY, MASSACHUSETTS

ATTACHMENT 10 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: 744 SCONTICUT NECK ROAD, TOWN OF FAIRHAVEN, BRISTOL COUNTY, MASSACHUSETTS

ATTACHMENT 11 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE FORT TABER HISTORIC DISTRICT AND THE FORT RODMAN HISTORIC DISTRICT, TOWN OF NEW BEDFORD, BRISTOL COUNTY, MASSACHUSETTS

ATTACHMENT 12 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: SEVEN HISTORIC PROPERTIES, TOWN OF WESTPORT, BRISTOL COUNTY, MASSACHUSETTS

ATTACHMENT 13 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM, NINE HISTORIC PROPERTIES SUBJECT TO ADVERSE EFFECTS IN THE TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS

ATTACHMENT 14 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE GAY HEAD LIGHTHOUSE, TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS

ATTACHMENT 15 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: CAPT. SAMUEL HANCOCK – CAPT. WEST MITCHELL HOUSE, RUSSELL HANCOCK HOUSE, RUSSELL HANCOCK HOUSE, ERNEST FLANDERS HOUSE, BARN, AND SHOP, SIMON MAYHEW HOUSE, AND FLAGHOLE, TOWN OF CHILMARK, DUKES COUNTY, MASSACHUSETTS

ATTACHMENT 16 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE SCRUBBY NECK SCHOOLHOUSE, TOWN OF WEST TISBURY, DUKES COUNTY, MASSACHUSETTS

ATTACHMENT 17 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE KAY STREET-CATHERINE STREET-OLD BEACH ROAD HISTORIC DISTRICT/THE HILL, THE OCHRE POINT – CLIFFS HISTORIC DISTRICT, AND THE OCEAN DRIVE HISTORIC DISTRICT NATIONAL HISTORIC LANDMARK, CITY OF NEWPORT, NEWPORT COUNTY, RHODE ISLAND

ATTACHMENT 18 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE BELLEVUE AVENUE HISTORIC DISTRICT, ROSECLIFF, THE BEAKERS, AND THE MARBLE HOUSE, CITY OF NEWPORT, NEWPORT COUNTY, RHODE ISLAND

ATTACHMENT 19 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: HORSEHEAD/MARBELLA, TOWN OF JAMESTOWN, NEWPORT COUNTY, RHODE ISLAND

ATTACHMENT 20 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE ABBOTT PHILLIPS HOUSE, THE STONE HOUSE INN, THE WARREN'S POINT HISTORIC DISTRICT, AND TUNIPUS GOOSEWING FARM, TOWN OF LITTLE COMPTON, NEWPORT COUNTY, RHODE ISLAND

ATTACHMENT 21 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: NINE HISTORIC PROPERTIES, TOWN OF MIDDLETOWN, NEWPORT COUNTY, RHODE ISLAND

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ATTACHMENT 23 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: EIGHT HISTORIC PROPERTIES, TOWN OF NARRAGANSETT, WASHINGTON COUNTY, RHODE ISLAND

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ATTACHMENT 25 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THIRTY-ONE HISTORIC PROPERTIES, TOWN OF NEW SHOREHAM, WASHINGTON COUNTY, RHODE ISLAND

ATTACHMENT 26 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE BROWNINGS BEACH HISTORIC DISTRICT, TOWN OF SOUTH KINGSTOWN, WASHINGTON COUNTY, MASSACHUSETTS

ATTACHMENT 27 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: EIGHT HISTORIC LIGHTHOUSES, MASSACHUSETTS AND RHODE ISLAND

ATTACHMENT 28 – REVOLUTION WIND EXPORT CABLE ONSHORE SUBSTATION AND INTERCONNECTION FACILITY, NORTH KINGSTOWN, RHODE ISLAND: PROCEDURES GUIDING THE DISCOVERY OF UNANTICIPATED CULTURAL RESOURCES AND HUMAN REMAINS

ATTACHMENT 29 – UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL SITES, HISTORIC PROPERTIES, AND CULTURAL RESOURCES INCLUDING HUMAN REMAINS: REVOLUTION WIND FARM FOR LEASE AREA OCS A-0486 CONSTRUCTION AND OPERATIONS PLAN

DRAFT

ATTACHMENT 1 –PROGRAMMATIC AGREEMENT
[Insert ATTACHMENT 1 – PROGRAMMATIC AGREEMENT]

DRAFT

MAY 23 2012

PROGRAMMATIC AGREEMENT
Among
The U.S. Department of the Interior, Bureau of Ocean Energy Management;
the State Historic Preservation Officers of Massachusetts and Rhode Island;
The Mashpee Wampanoag Tribe;
The Narragansett Indian Tribe;
The Wampanoag Tribe of Gay Head (Aquinnah); and
The Advisory Council on Historic Preservation;
Regarding
the "Smart from the Start" Atlantic Wind Energy Initiative:
Leasing and Site Assessment Activities offshore Massachusetts and Rhode Islands

WHEREAS, the Energy Policy Act of 2005, Pub. L. No. 109-58, added Section 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the Outer Continental Shelf (OCS) for the purpose of renewable energy development, including wind energy development. *See* 43 U.S.C. § 1337(p)(1)(C); and

WHEREAS, the Secretary delegated this authority to the former Minerals Management Service (MMS), now the Bureau of Ocean Energy Management (BOEM), and promulgated final regulations implementing this authority at 30 CFR Part 585; and

WHEREAS, under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process that occurs in distinct phases: lease issuance; approval of a site assessment plan (SAP); and approval of a construction and operation plan (COP); and

WHEREAS, BOEM is currently identifying areas that may be suitable for wind energy leasing through collaborative, consultative, and analytical processes; and

WHEREAS, the issuance of a commercial wind energy lease gives the lessee the exclusive right to subsequently seek BOEM approval of plans (SAPs and COPs) for the development of the leasehold; and

WHEREAS, the lease does not grant the lessee the right to construct any facilities; rather, the lease grants the lessee the right to use the leased area to develop its plans, which must be approved by BOEM before the lessee implements them. *See* 30 CFR 585.600 and 585.601; and

WHEREAS, the SAP contains the lessee's detailed proposal for the construction of a meteorological tower and/or the installation of meteorological buoys ("site assessment activities") on the leasehold. *See* 30 CFR 585.605 - 585.618; and

WHEREAS, the lessee's SAP must be approved by BOEM before it conducts these "site assessment" activities on the leasehold; and

WHEREAS, BOEM may approve, approve with modification, or disapprove a lessee's SAP. *See* 30 CFR 585.613; and

WHEREAS, the COP is a detailed plan for the construction and operation of a wind energy project on the lease. *See* 30 CFR 585.620-585.638; and

WHEREAS, BOEM approval of a COP is a precondition to the construction of any wind energy facility on the OCS. *See* 30 CFR 585.600; and

WHEREAS, the regulations require that a lessee provide the results of surveys with its SAP and COP for the areas affected by the activities proposed in each plan, including an archaeological resource survey. *See* 30 CFR 585.610(b)(3) and 30 CFR 585.626(a)(5). BOEM refers to surveys undertaken to acquire this information as "site characterization" activities. *See Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 585* at: http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH4-11-2011-pdf.aspx; and

WHEREAS, BOEM has embarked upon the "Smart from the Start" Atlantic Wind Energy Initiative for the responsible development of wind energy resources on the Atlantic OCS; and

WHEREAS, under the "Smart from the Start" Initiative, BOEM has identified areas on the OCS that appear most suitable for future wind energy activities offshore the Commonwealth of Massachusetts (MA) and the State of Rhode Island (RI); and

WHEREAS these areas are located: (1) within the Rhode Island-Massachusetts Wind Energy Area (WEA); and (2) within the MA Call area east of the Rhode Island-Massachusetts WEA (hereafter known as "Areas"); and

WHEREAS BOEM may issue multiple renewable energy leases and approve multiple SAPs on leases issued within these Areas; and

WHEREAS, BOEM has determined that issuing leases and approving SAPs within these Areas constitute multiple undertakings subject to Section 106 of the National Historic Preservation Act (NHPA; 16 U.S.C. § 470f), and its implementing regulations (36 CFR 800); and

WHEREAS, BOEM has determined that the implementation of the program is complex as the decisions on these multiple undertakings are staged, pursuant to 36 CFR § 800.14(b); and

WHEREAS, the implementing regulations for Section 106 (36 CFR § 800) prescribe a process that seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among parties with an interest in the effects of the undertakings, commencing at the early stages of the process; and

WHEREAS, the Section 106 consultations have been initiated and coordinated with other reviews, including the National Environmental Policy Act (NEPA), in accordance with 36 CFR § 800.3(b); and

WHEREAS, 36 CFR § 800.14(b)(3) provides for developing programmatic agreements (Agreements) for complex or multiple undertakings and § 800.14(b)(1)(ii) and (v) provide for developing Agreements when effects on historic properties cannot be fully determined prior to approval of an undertaking and for other circumstances warranting a departure from the normal section 106 process; and

WHEREAS, 36 CFR § 800.4(b)(2) provides for phased identification and evaluation of historic properties where alternatives consist of large land areas, and for the deferral of final identification and evaluation of historic properties when provided for in a Agreement executed pursuant to 36 CFR §800.14(b); and

WHEREAS, BOEM has determined that the identification and evaluation of historic properties shall be conducted through a phased approach, pursuant to 36 CFR § 800.4(b)(2), where the final identification of historic properties will occur after the issuance of a lease or leases and before the approval of a SAP; and

WHEREAS, the Section 106 consultations described in this Agreement will be used to establish a process for identifying historic properties located within the undertakings' Areas of Potential Effects (APE) that are listed in or eligible for listing in the National Register of Historic Places (National Register), and assess the potential adverse effects and avoid, reduce, or resolve any such effects through the process set forth in this Agreement; and

WHEREAS, according to 36 CFR § 800.16(l)(1) "historic property" means

> *any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria*; and

WHEREAS, the APEs, as defined in 36 CFR § 800.16(d) of the Advisory Council on Historic Preservation's (ACHP's) regulations implementing Section 106 of the NHPA, for the undertakings that are the subject of this Agreement, are: (1) the depth and breadth of the seabed that could potentially be impacted by seafloor/bottom-disturbing activities associated with the undertakings (e.g., core samples, anchorages and installation of meteorological towers and buoys); and (2) the viewshed from which lighted meteorological structures would be visible; and

WHEREAS, BOEM has identified and consulted with the State Historic Preservation Offices (SHPOs) for MA and RI, (collectively, "the SHPOs"); and

WHEREAS, BOEM initiated consultation in 2011 and 2012 through letters of invitation, telephone calls, emails, meetings, webinars, and the circulation and discussion of this Agreement in draft; and this outreach and notification included contacting over 66 individuals and entities, including federally-recognized Indian Tribes (Tribes), local governments, SHPOs, and the public; and

WHEREAS, BOEM has initiated formal government-to-government consultation with the following Tribes: the Mashpee Wampanoag Tribe, the Narragansett Indian Tribe, the Shinnecock Indian Nation, and the Wampanoag Tribe of Gay Head (Aquinnah); and

WHEREAS, these Tribes have chosen to consult with BOEM and participate in development of this Agreement, in which the term Tribe refers to them, within the meaning of 36 CFR § 800.16(m); and

WHEREAS, BOEM shall continue to consult with these Tribes to identify properties of religious and cultural significance that may be eligible for listing in the National Register of Historic Places (Traditional Cultural Properties or TCPs) and that may be affected by these undertakings; and

WHEREAS, BOEM involves the public and identifies other consulting parties through notifications, requests for comments, existing renewable energy task forces, contact with SHPOs, NEPA scoping meetings and communications for these proposed actions; and

WHEREAS, BOEM, the SHPOs, the Mashpee Wampanoag Tribe, the Narragansett Indian Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah) and the ACHP are Signatories to this Agreement, and

WHEREAS, future submission of a COP and commercial-scale development that may or may not occur within the Areas would be separate undertakings and considered under future, separate Section 106 consultation(s) not under this Agreement; and

WHEREAS, BOEM requires a SAP to include the results of site characterization surveys that will identify potential archaeological resources that could be affected by the installation and operation of meteorological facilities. *See* (30 CFR § 585.611 (b)(6); and

WHEREAS, consultations conducted prior to the execution of this Agreement included all steps in the Section 106 process up to and including consulting on the scope of identification efforts that would be used to conduct site characterization surveys that would identify historic properties that may be impacted by activities described in the SAP pursuant to 36 CFR § 800.4(a); and

WHEREAS, these consultations resulted in recommendations to BOEM that the following items should be added to leases issued within the Areas, both to ensure that

historic properties that may be impacted by activities described in the SAP are identified through a reasonable and good faith effort (§ 800.4(b)(1)), and also to ensure that properties identified through the geophysical surveys are not impacted by geotechnical sampling:

> *The lessee may only conduct geotechnical (sub-bottom) sampling activities in areas of the leasehold in which an analysis of the results of geophysical surveys has been completed for that area. The geophysical surveys must meet BOEM's minimum standards (see Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 285 at* http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/GGARCH4-11-2011-pdf.aspx*), and the analysis must be completed by a qualified marine archaeologist who both meets the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738- 44739) and has experience analyzing marine geophysical data. This analysis must include a determination whether any potential archaeological resources are present in the area and the geotechnical (sub-bottom) sampling activities must avoid potential archaeological resources by a minimum of 50.0 meters (m; 164.0 feet). The avoidance distance must be calculated from the maximum discernible extent of the archaeological resource. In no case may the lessee's actions impact a potential archaeological resource without BOEM's prior approval*;

NOW, THEREFORE, BOEM, the ACHP, the SHPOs, Tribes, and the other concurring parties (the Parties), agree that Section 106 consultation shall be conducted in accordance with the following stipulations in order to defer final identification and evaluation of historic properties.

STIPULATIONS

I. SAP Decisions. Before making a decision on a SAP from a lessee, BOEM will treat all potential historic properties identified as a result of site characterization studies and consultations as historic properties potentially eligible for inclusion on the National Register and avoid them by requiring the lessee to relocate the proposed project, resulting in a finding of *No historic properties affected* (36 CFR § 800.4(d)(1)). If a potential historic property is identified, and the lessee chooses to conduct additional investigations, and:

   A. If additional investigations demonstrate that a historic property does not exist, then BOEM will make a determination of *No historic properties affected* and follow 36 CFR § 800.4(d)(1).

B. If additional investigations demonstrate that a historic property does exist and may be affected, BOEM will evaluate the historic significance of the property, in accordance with 800.4(c); make a determination of *Historic properties affected* and follow 36 CFR § 800.4(d)(2); and resolve any adverse effects by following 800.5.

II. Tribal Consultation. BOEM shall continue to consult with the Tribes throughout the implementation of this Agreement in a government-to-government manner consistent with Executive Order 13175, Presidential memoranda, and any Department of the Interior policies, on subjects related to the undertakings.

III. Public Participation

A. Because BOEM and the Parties recognize the importance of public participation in the Section 106 process, BOEM shall continue to provide opportunities for public participation in Section 106-related activities, and shall consult with the Parties on possible approaches for keeping the public involved and informed throughout the term of the Agreement.

B. BOEM shall keep the public informed and may produce reports on historic properties and on the Section 106 process that may be made available to the public at BOEM's headquarters, on the BOEM website, and through other reasonable means insofar as the information shared conforms to the confidentiality clause of this Agreement (Stipulation IV).

IV. Confidentiality. Because BOEM and the Parties agree that it is important to withhold from disclosure sensitive information such as that which is protected by NHPA Section 304 (16 U.S.C. § 470w-3) (*e.g.*, the location, character and ownership of an historic resource, if disclosure would cause a significant invasion of privacy, risk harm to the historic resources, or impede the use of a traditional religious site by practitioners), BOEM shall:

A. Request that each Party inform the other Parties if, by law or policy, it is unable to withhold sensitive data from public release.

B. Arrange for the Parties to consult as needed on how to protect such information collected or generated under this Agreement.

C. Follow, as appropriate, 36 CFR 800.11(c) for authorization to withhold information pursuant to NHPA Section 304, and otherwise withhold sensitive information to the extent allowable by laws including the Freedom of Information Act, 5 U.S.C. § 552, through the Department of the Interior regulations at 43 CFR Part 2.

D. Request that the Parties agree that materials generated during consultation be treated by the Parties as internal and pre-decisional until they are formally released, although the Parties understand that they may need to be released by one of the Parties if required by law.

V. Administrative Stipulations

A. In coordinating reviews, BOEM shall follow this process:

1. Standard Review: The Parties shall have a standard review period of thirty (30) calendar days for commenting on all documents which are developed under the terms of this Agreement, from the date they are sent by BOEM.

2. Expedited Request for Review: The Parties recognize the time-sensitive nature of this work and shall attempt to expedite comments or concurrence when BOEM so requests. The expedited comment period shall not be less than fifteen (15) calendar days from the date BOEM sends such a request.

3. If a Party cannot meet BOEM's expedited review period request, it shall notify BOEM in writing within the fifteen (15) calendar day period. If a Party fails to provide comments or respond within the time frame requested by BOEM (either standard or expedited), then BOEM may proceed as though it has received concurrence from that Party. BOEM shall consider all comments received within the review period.

4. All Parties will send correspondence and materials for review via electronic media unless a Party requests, in writing, that BOEM transmit the materials by an alternate method specified by that Party. Should BOEM transmit the review materials by the alternate method, the review period will begin on the date the materials were received by the Party, as confirmed by delivery receipt.

5. MA and RI SHPO Review Specifications: All submittals to the MA and RI SHPOs shall be in paper format and shall be delivered to the MA and RI SHPOs' offices by US Mail, by a delivery service, or by hand. Plans and specifications submitted to the MA and RI SHPOs shall measure no larger than 11" x 17" paper format (unless another format is specified in consultation). The MA and RI SHPOs shall review and comment on all adequately documented project submittals within 30 calendar days of receipt unless a response has been requested within the expedited review period specified in Stipulation V.A.2.

6. Each Signatory shall designate a point of contact for carrying out this Agreement and provide this contact's information to the other Parties, updating it as necessary while this Agreement is in force. Updating a point of contact alone shall not necessitate an amendment to this Agreement.

B. Dispute Resolution. Should any Signatory object in writing to BOEM regarding an action carried out in accordance with this Agreement, or lack of compliance with the terms of this Agreement, the Signatories shall consult to resolve the objection. Should the Signatories be unable to resolve the disagreement, BOEM shall forward its background information on the dispute as well as its proposed resolution of the dispute to the ACHP. Within 45 calendar days after receipt of all pertinent documentation, the ACHP shall either: (1) provide BOEM with written recommendations, which BOEM shall take into account in reaching a final decision regarding the dispute; or (2) notify BOEM that it shall comment pursuant to 36 CFR 800.7(c), and proceed to comment. BOEM shall take this ACHP comment into account, in accordance with 36 CFR 800.7(c)(4). Any ACHP recommendation or comment shall be understood to pertain only to the subject matter of the dispute; BOEM's responsibility to carry out all actions under this Agreement that are not subjects of dispute shall remain unchanged.

C. Amendments. Any Signatory may propose to BOEM in writing that the Agreement be amended, whereupon BOEM shall consult with the Parties to consider such amendment. This Agreement may then be amended when agreed to in writing by all Signatories, becoming effective on the date that the amendment is executed by the ACHP as the last Signatory.

D. Adding Federal Agencies. In the event that another Federal agency believes it has Section 106 responsibilities related to the undertakings which are the subject of this Agreement, that agency may attempt to satisfy its Section 106 responsibilities by agreeing in writing to the terms of this Agreement and notifying and consulting with the SHPOs and the ACHP. Any modifications to this agreement that may be necessary for meeting that agency's Section 106 obligations shall be considered in accordance with this Agreement.

E. Adding Concurring Parties. In the event that another party wishes to assert its support of this Agreement, that party may prepare a letter indicating its concurrence, which BOEM will attach to the Agreement and circulate among the Signatories.

F. Term of Agreement. The Agreement shall remain in full force until BOEM makes a final decision on the last SAP submitted under a lease issued under this portion of the "Smart from the Start" initiative, or for ten (10) years from the date the Agreement is executed, defined as the date the last signatory

signs, whichever is earlier, unless otherwise extended by amendment in accordance with this Agreement.

G. Termination.

1. If any Signatory determines that the terms of the Agreement cannot or are not being carried out, that Party shall notify the other Signatories in writing and consult with them to seek amendment of the Agreement. If within sixty (60) calendar days, an amendment cannot be made, any Signatory may terminate the Agreement upon written notice to the other Signatories.

2. If termination is occasioned by BOEM's final decision on the last SAP contemplated under this portion of the "Smart from the Start" Initiative, BOEM shall notify the Parties and the public, in writing.

H. Anti-Deficiency Act. Pursuant to 31 U.S.C. § 1341(a)(1), nothing in this Agreement shall be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

I. Existing Law and Rights. Nothing in this Agreement shall abrogate existing laws or the rights of any consulting party or agency party to this Agreement.

J. Compliance with Section 106. Execution and implementation of this Agreement evidences that BOEM has satisfied its Section 106 responsibilities for all aspects of these proposed undertakings by taking into account the effects of these undertakings on historic properties and affording the ACHP a reasonable opportunity to comment with regard to the undertakings.

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

By:

Maureen A. Bornholdt Date: 5-23-12

Maureen A. Bornholdt
Program Manager, Office of Renewable Energy Programs
Bureau of Ocean Energy Management

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Brona Simon Date: 5/31/12

Brona Simon
Massachusetts Historical Commission
Massachusetts State Historic Preservation Officer

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Edward F. Sanderson Date: 6/4/2012

[NAME]
[TITLE]
Rhode Island State Historic Preservation Officer

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

Date: 05 June 2012

John Brown
Tribal Historic Preservation Officer
Narragansett Indian Tribe

Cedric Cromwell Date: 5/29/12

Cedric Cromwell
Tribal Chairman
Mashpee Wampanoag Tribe

Programmatic Agreement concerning the "Smart from the Start" Atlantic Wind Energy Initiative: Leasing and Site Assessment Activities offshore Massachusetts and Rhode Island

John M. Fowler Date: 6/8/12

John M. Fowler
Executive Director
Advisory Council on Historic Preservation

ATTACHMENT 2 – AREA OF POTENTIAL EFFECTS MAPS

[Insert ATTACHMENT 2 – APE MAPS]

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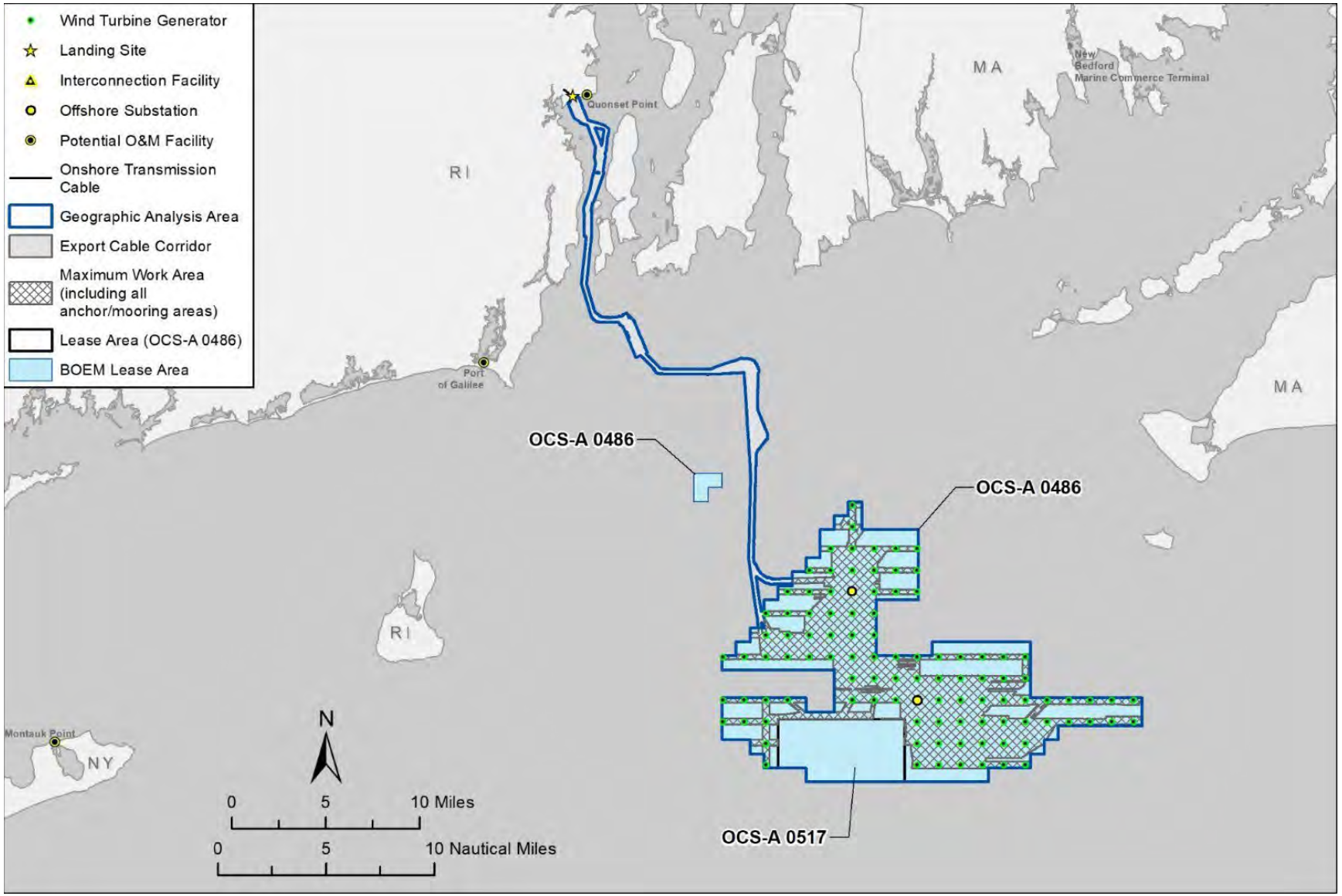

Figure 1. Revolution Wind construction and operations plan proposed offshore Project elements.

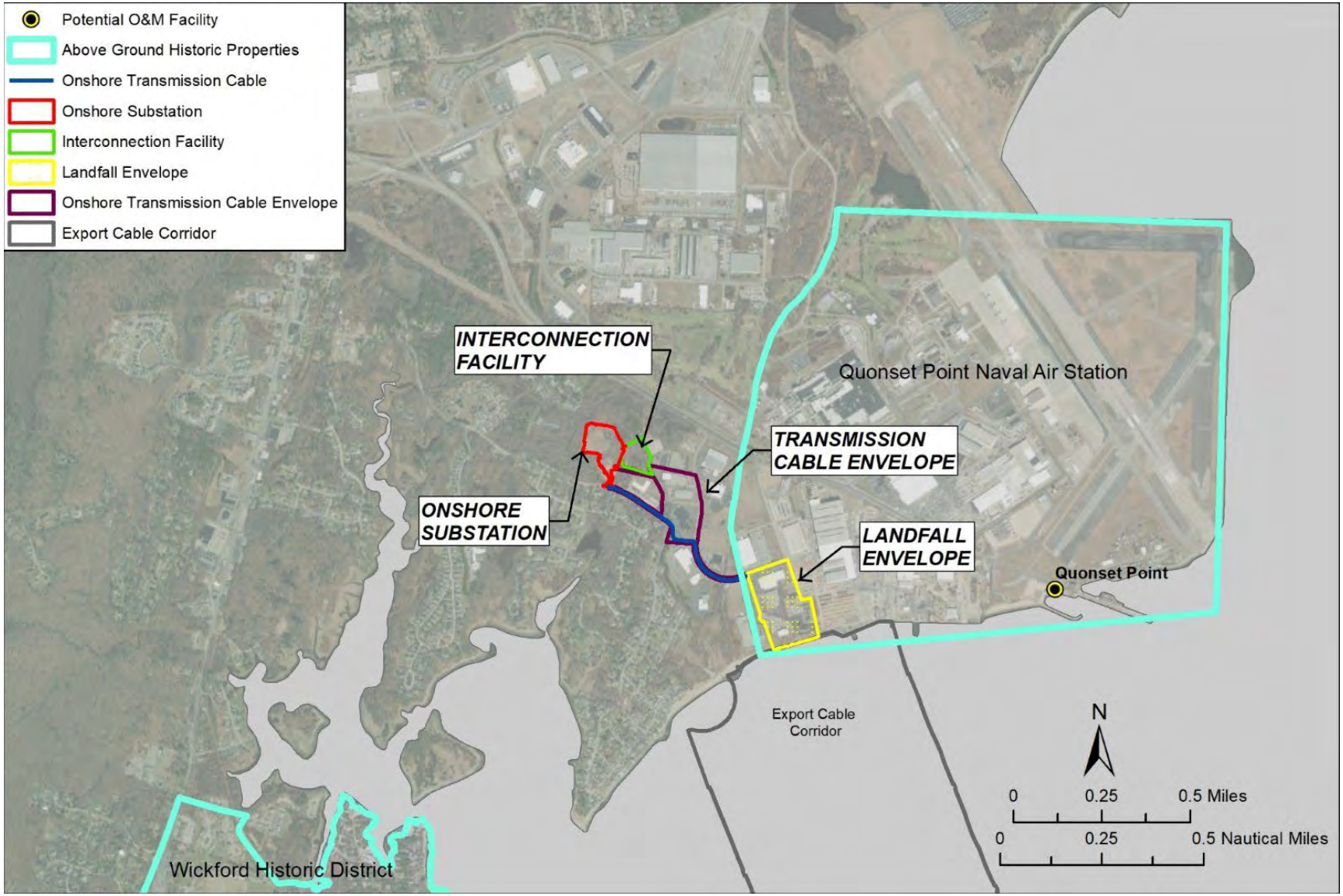

Figure 2. Revolution Wind construction and operations plan proposed onshore Project elements.

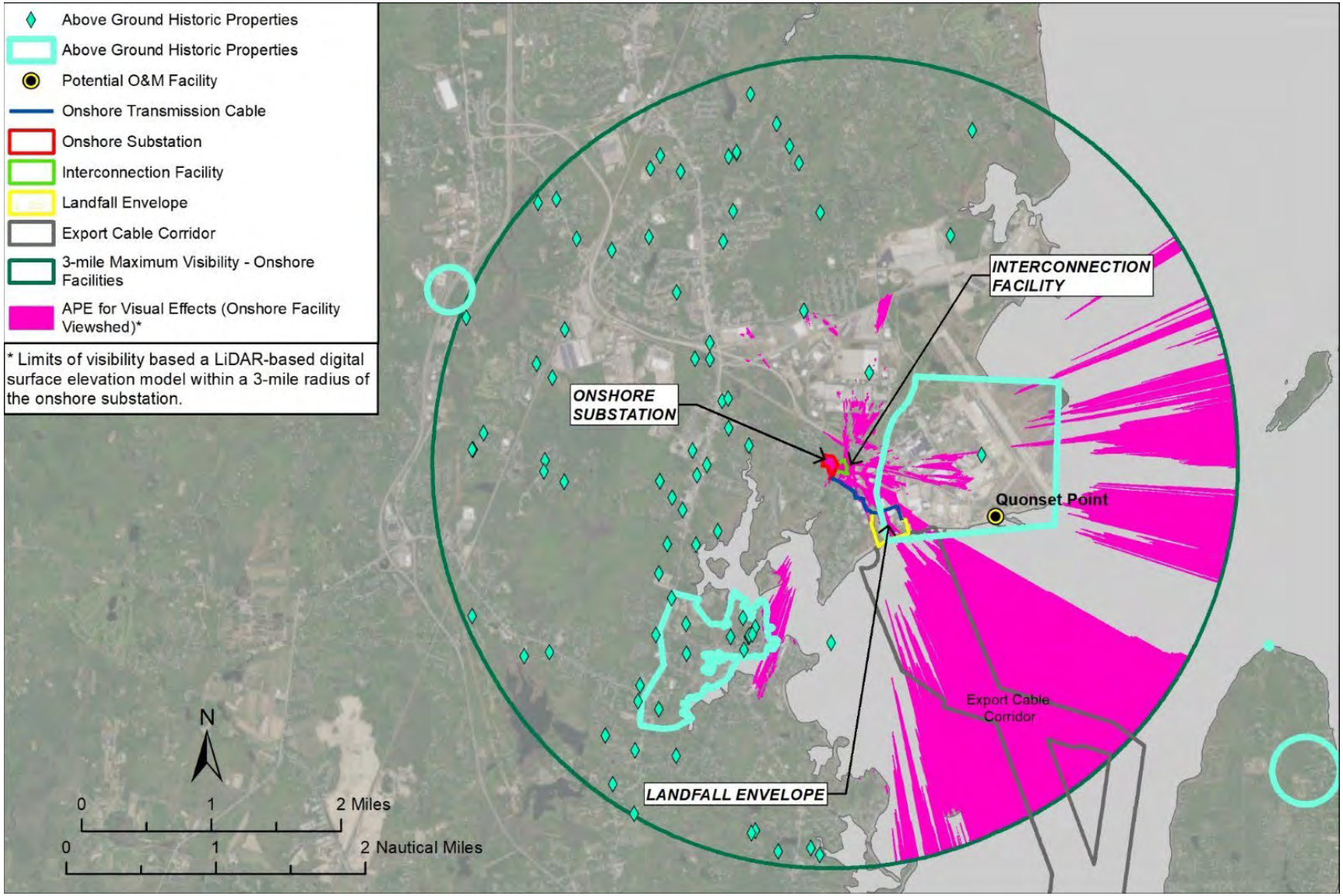

Figure 3. Visual area of potential effects and visual effects assessment geographic analysis area – onshore.

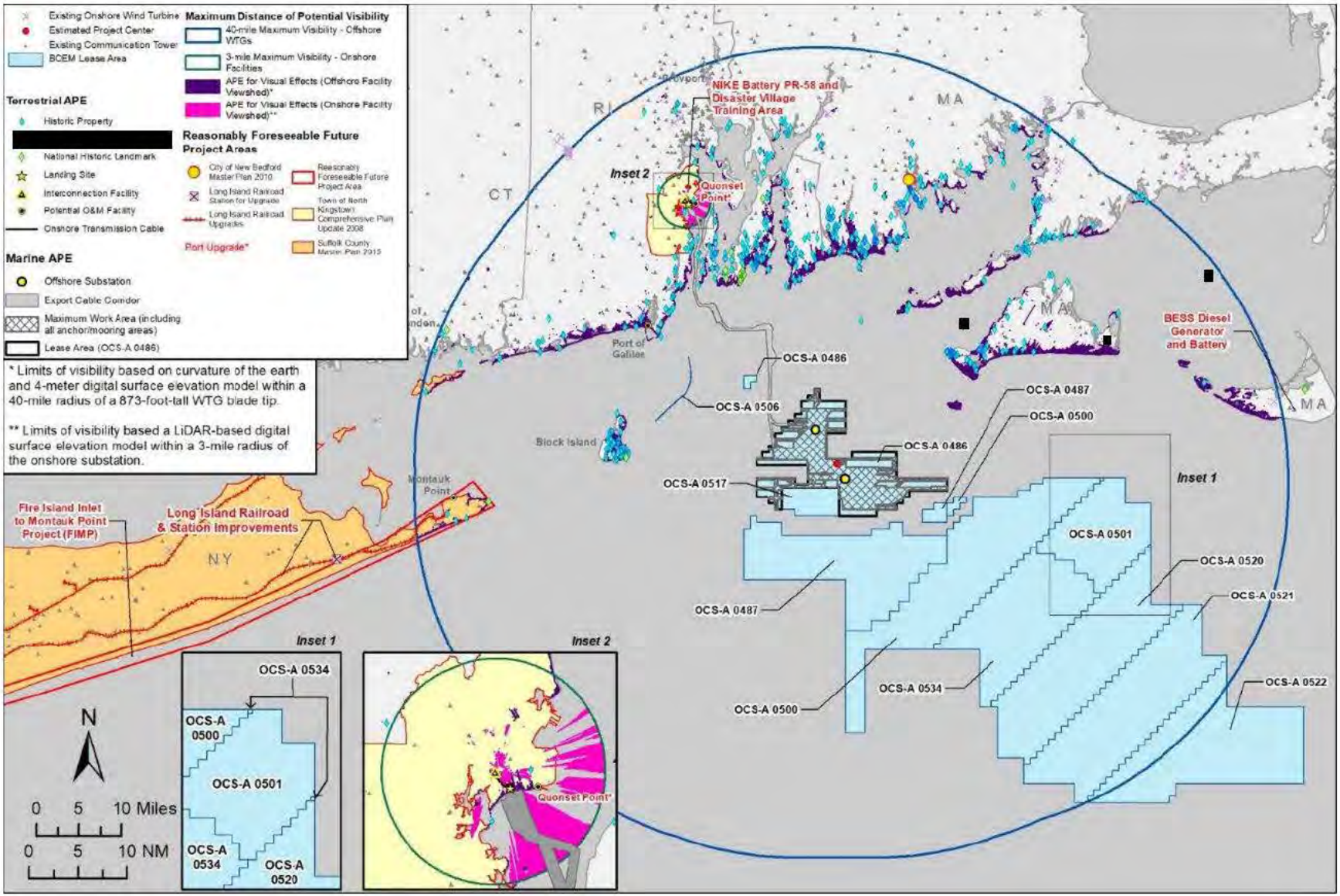

Figure 4. Visual area of potential effects and visual effects assessment geographic analysis area – offshore.

ATTACHMENT 3 – ABOVE GROUND HISTORIC PROPERTIES ADVERSELY AFFECTED BY THE PROJECT

Table 1. Above Ground Historic Properties Adversely Affected by the Project, in Order of Nearest Distance to Project WTGs

Survey ID	Visually Sensitive Resource	Municipality	County	State	Property Designation	Distance to nearest RWF WTG (miles)
TCP-3	[redacted] TCP	[redacted]	[redacted]	MA	NRHP-eligible (BOEM determined)	6*
300	Sakonnet Light Station	Little Compton	Newport	RI	NRHP-listed resource	12.7
297	Warren Point Historic District	Little Compton	Newport	RI	NRHP-eligible resource (RIHPHC determined)	12.9
299	Abbott Phillips House	Little Compton	Newport	RI	RIHPHC historic resource	13
504	Flaghole	Chilmark	Dukes	MA	MHC historic inventory site	13.3
296	Stone House Inn	Little Compton	Newport	RI	NRHP-listed resource	13.4
503	Simon Mayhew House	Chilmark	Dukes	MA	MHC historic inventory site	13.5
474	Flanders, Ernest House, Shop, Barn	Aquinnah	Dukes	MA	MHC historic inventory site	13.8
496	71 Moshup Trail	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
484	Vanderhoop, Edwin DeVries Homestead	Aquinnah	Dukes	MA	NRHP-listed resource	13.7
480	Gay Head - Aquinnah Shops Area	Aquinnah	Dukes	MA	MHC historic inventory site	13.7
495	3 Windy Hill Drive	Aquinnah	Dukes	MA	MHC historic inventory site	13.9
479	Gay Head Light	Aquinnah	Dukes	MA	NRHP-listed resource	13.9
485	Tom Cooper House	Aquinnah	Dukes	MA	MHC historic inventory site	14
497	Leonard Vanderhoop House	Aquinnah	Dukes	MA	MHC historic inventory site	14
490	Theodore Haskins House	Aquinnah	Dukes	MA	MHC historic inventory site	14.1
486	Gay Head - Aquinnah Coast Guard Station Barracks	Aquinnah	Dukes	MA	MHC historic inventory site	14.1
491	Gay Head - Aquinnah Town Center Historic District	Aquinnah	Dukes	MA	NRHP-listed resource	14.2
303	Gooseneck Causeway	Westport	Bristol	MA	MHC historic inventory site	14.8
304	Gooseberry Neck Observation Towers	Westport	Bristol	MA	MHC historic inventory site	14.8
540	Spring Street	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	14.9
590	Capt. Mark L. Potter House	New Shoreham	Washington	RI	RIHPHC historic resource	14.9
276	Tunipus Goosewing Farm	Little Compton	Newport	RI	NRHP-Eligible Resource (RIHPHC Determined)	15
543	WWII Lookout Tower – Spring Street	New Shoreham	Washington	RI	NRHP-Eligible Resource (RIHPHC Determined)	15.1
251	Westport Harbor	Westport	Bristol	MA	MHC historic inventory site	15.2
290	Bellevue Avenue Historic District NHL	Newport	Newport	RI	NHL	15.2
548	Block Island Southeast Light	New Shoreham	Washington	RI	NHL	15.2
595	New Shoreham Historic District	New Shoreham	Washington	RI	Local Historic	15.3
536	Spring Cottage	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
531	Old Harbor Historic District	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC-determined)	15.3
538	Captain Welcome Dodge Sr.	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
541	Caleb W. Dodge Jr. House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.3
535	Spring House Hotel	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4
545	Pilot Hill Road and Seaweed Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.4
222	Ocean Drive Historic District NHL	Newport	Newport	RI	NHL	15.7
298	Marble House NHL	Newport	Newport	RI	NHL	15.7
597	Ochre Point – Cliffs Historic District	Newport	Newport	RI	NRHP-listed resource	15.8

546	WWII Lookout Tower at Sands Pond	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.8
552	Sea View Villa	Middletown	Newport	RI	RIHPHC historic resource	15.9
295	Rosecliff/Oelrichs (Hermann) House/ Mondroe (J. Edgar) House	Newport	Newport	RI	NRHP-listed resource	15.9
293	The Breakers NHL	Newport	Newport	RI	NHL	15.9
516	Corn Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	15.9
302	Clam Shack Restaurant	Westport	Bristol	MA	MHC historic inventory site	15.9
301	Horseneck Point Lifesaving Station	Westport	Bristol	MA	MHC historic inventory site	15.9
553	Whetstone	Middletown	Newport	RI	RIHPHC historic resource	16
284	The Bluff/John Bancroft Estate	Middletown	Newport	RI	RIHPHC historic resource	16
288	Clambake Club of Newport	Middletown	Newport	RI	NRHP-listed resource	16
530	Old Town and Center Roads	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16
526	Beach Avenue	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
519	Mitchell Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.1
523	Indian Head Neck Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.2
168	Westport Pt. Revolutionary War Properties	Westport	Bristol	MA	MHC historic inventory site	16.2
261	Indian Avenue Historic District	Middletown	Newport	RI	NRHP-listed resource	16.2
278	St. Georges School	Middletown	Newport	RI	NRHP-listed resource	16.3
528	Hygeia House	New Shoreham	Washington	RI	NRHP-listed resource	16.3
527	U.S. Weather Bureau Station	New Shoreham	Washington	RI	NRHP-listed resource	16.3
549	Miss Abby E. Vaill/1 of 2 Vaill cottages	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
550	Hon. Julius Deming Perkins / "Bayberry Lodge"	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.4
542	Lakeside Drive and Mitchell Lane	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.5
280	Land Trust Cottages	Middletown	Newport	RI	NRHP-eligible resource (RIHPHC determined)	16.6
482	Russell Hancock House	Chilmark	Dukes	MA	MHC historic inventory site	16.6
163	Westport Point Historic District (1 of 2)	Westport	Bristol	MA	NRHP-eligible resource (MHC determined)	16.7
164	Westport Point Historic District (2 of 2)	Westport	Bristol	MA	NRHP-listed resource	16.7
551	Mohegan Cottage/Everett D. Barlow House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.7
266	Paradise Rocks Historic District	Middletown	Newport	RI	RIHPHC historic resource	16.8
547	Lewis- Dickens Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.8
525	Island Cemetery/Old Burial Ground	New Shoreham	Washington	RI	RI Historical Cemetery	16.8
279	Kay St.-Catherine St.-Old Beach Rd. Historic District/The Hill	Newport	Newport	RI	NRHP-listed resource	16.9
532	Beacon Hill Road	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.9
533	Nathan Mott Park	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	16.9
515	Block Island North Lighthouse	New Shoreham	Washington	RI	NRHP-listed resource	17.1
522	Champlin Farm	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.1
517	Hippocampus/Boy's Camp/ Beane Family	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.2
520	U.S. Lifesaving Station	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
518	U.S. Coast Guard Brick House	New Shoreham	Washington	RI	NRHP-eligible resource (RIHPHC determined)	17.4
521	Peleg Champlin House	New Shoreham	Washington	RI	NRHP-listed resource	17.5

469	Hancock, Captain Samuel - Mitchell, Captain West House	Chilmark	Dukes	MA	NRHP-eligible resource (MHC determined)	17.6
508	Scrubby Neck Schoolhouse	West Tisbury	Dukes	MA	MHC historic inventory site	18
345	Point Judith Lighthouse	Narragansett	Washington	RI	NRHP-listed resource	18.2
245	Bailey Farm	Middletown	Newport	RI	NRHP-listed resource	18.3
226	Beavertail Light	Jamestown	Newport	RI	NRHP-listed resource	18.4
582	Horsehead/Marbella	Jamestown	Newport	RI	NRHP-listed resource	18.6
333	Ocean Road Historic District	Narragansett	Washington	RI	NRHP-listed resource	18.9
335	Dunmere	Narragansett	Washington	RI	NRHP-listed resource	19.1
86	Puncatest Neck Historic District	Tiverton	Newport	RI	RIHPHC historic resource	19.4
576	Fort Varnum/Camp Varnum	Narragansett	Washington	RI	NRHP-eligible resource (RIHPHC determined)	19.6
156	Salters Point	Dartmouth	Bristol	MA	MHC historic inventory site	19.7
578	Dunes Club	Narragansett	Washington	RI	NRHP-listed resource	19.8
329	Life Saving Station at Narragansett Pier	Narragansett	Washington	RI	NRHP-listed resource	19.8
330	The Towers Historic District	Narragansett	Washington	RI	NRHP-listed resource	19.8
591	Narragansett Pier MRA	Narragansett	Washington	RI	NRHP-listed resource	19.8
328	The Towers/Tower Entrance of Narragansett Casino	Narragansett	Washington	RI	NRHP-listed resource	19.9
TCP-1	[redacted] TCP	[redacted]	[redacted]	MA	NRHP-eligible resource (BOEM determined)	20
343	Brownings Beach Historic District	South Kingstown	Washington	RI	NRHP-listed resource	21.8
444	Tarpaulin Cove Light	Gosnold	Dukes	MA	NRHP-listed resource	22.2
391	Clark's Point Light	New Bedford	Bristol	MA	NRHP-listed resource	24.6
390	Fort Rodman Historic District	New Bedford	Bristol	MA	NRHP-eligible resource (MHC determined)	24.6
392	Fort Taber Historic District	New Bedford	Bristol	MA	NRHP-listed resource	24.6
386	Butler Flats Light Station	New Bedford	Bristol	MA	NRHP-listed resource	25.6
389	744 Sconticut Neck Road	Fairhaven	Bristol	MA	MHC historic inventory site	25.9
449	Nobska Point Lighthouse	Falmouth	Barnstable	MA	NRHP-listed resource	28

Notes: MHC = Massachusetts Historical Commission, RIHPC = Rhode Island Historical Preservation & Heritage Commission.

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ATTACHMENT 4 – LIST OF CONSULTING PARTIES

Table 1. Parties Invited to Participate in Section 106 Consultation

Participants in the Section 106 Process	Invited Consulting Parties
SHPOs and state agencies	Connecticut State Historic Preservation Office
	Connecticut Department of Economic and Community Development
	Rhode Island Historical Preservation & Heritage Commission
	New York State Division for Historic Preservation
	Massachusetts Historical Commission
	Massachusetts Board of Underwater Archaeological Resources
	Massachusetts Commissioner on Indian Affairs
	Rhode Island Department of Environmental Management
Federal agencies	National Park Service (NPS)
	National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division
	U.S. Army Corps of Engineers, New England District
	U.S. Army Corps of Engineers, New York District
	Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E))
	Naval Facilities Engineering Systems Command Headquarters– Cultural Resources
	Naval History and Heritage Command – Underwater Archaeology Branch
	Bureau of Safety and Environmental Enforcement
	U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning
	U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment
	Advisory Council on Historic Preservation
	U.S. Coast Guard -Sector SE New England
	U.S. Coast Guard - Marine Transportation Systems (CG-5PW)
	U.S. Coast Guard – First Coast Guard District
	U.S. Fish and Wildlife Service
	Environmental Protection Agency
	Federal Aviation Administration
Federally recognized Tribal Nations	Mashpee Wampanoag Tribe

Participants in the Section 106 Process	Invited Consulting Parties
	Shinnecock Indian Nation
	Mashantucket Pequot Tribal Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
	Mohegan Tribe of Indians of Connecticut
	Narragansett Indian Tribe
	Delaware Tribe of Indians
	The Delaware Nation
Non-federally recognized Tribal Nations	Chappaquiddick Tribe of Wampanoag Nation
	The Golden Hill Paugussett
	Eastern Pequot Tribal Nation
	Schaghticoke Tribal Nation
	Unkechaug Nation
Local governments	Cape Cod Commission
	City of Newport
	County of Dukes (MA)
	Town of Charlestown
	Town of East Hampton
	Town of Middletown
	Town of Nantucket
	Nantucket Planning & Economic Development Commission
	Town of Narragansett
	Town of North Kingstown
	City of Cranston
	City of East Providence
	City of Fall River
	City of New Bedford
	City of Providence
	City of Rehoboth
	City of Taunton
	County of Barnstable (MA)
	County of Bristol (MA)
	County of Plymouth (MA)
	County of Suffolk (NY)
	Town of Acushnet
	Town of Aquinnah
	Town of Barnstable
	Town of Barrington
	Town of Berkley

DRAFT

Participants in the Section 106 Process	Invited Consulting Parties
	Town of Bourne
	Town of Bristol
	Town of Chilmark
	Town of Coventry
	Town of Dartmouth
	Town of Dighton
	Town of East Greenwich
	Town of Edgartown
	Town of Exeter
	Town of Fairhaven
	Town of Falmouth
	Town of Freetown
	Town of Gosnold
	Town of Griswold
	Town of Groton
	Town of Hopkinton
	Town of Jamestown
	Town of Johnston
	Town of Lakeville
	Town of Ledyard
	Town of Little Compton
	Town of Marion
	Town of Mashpee
	Town of Mattapoisett
	Town of Middleborough
	Town of Nantucket
	Town of New Shoreham
	Town of North Stonington
	Town of Oak Bluffs
	Town of Portsmouth
	Town of Richmond
	Town of Rochester
	Town of Sandwich
	Town of Scituate
	Town of Seekonk
	Town of Somerset
	Town of South Kingstown
	Town of Southold

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Participants in the Section 106 Process	Invited Consulting Parties
	Town of Stonington
	Town of Swansea
	Town of Tisbury
	Town of Tiverton
	Town of Voluntown
	Town of Wareham
	Town of Warren
	Town of Warwick
	Town of West Greenwich
	Town of West Tisbury
	Town of West Warwick
	Town of Westerly
	Town of Westport
Non-governmental organizations or groups	Alliance to Protect Nantucket Sound
	Balfour Beatty Communities
	Block Island Historical Society
	Bristol Historical and Preservation Society
	East Greenwich Historic Preservation Society
	Gay Head Lighthouse Advisory Committee
	Martha's Vineyard Commission
	Montauk Historical Society
	Newport Historical Society
	Newport Restoration Foundation
	Preservation Massachusetts
	Rhode Island Historical Society
	Salve Regina University
	Southeast Lighthouse Foundation
	The Preservation Society of Newport County
	Revolution Wind, LLC (lessee)

Table 2. Consulting Parties Participating in Section 106 Consultation

Participants in the Section 106 Process	Participating Consulting Parties
SHPOs and state agencies	Connecticut State Historic Preservation Office
	Connecticut Department of Economic and Community Development
	Rhode Island Historical Preservation & Heritage Commission
	New York State Division for Historic Preservation
	Massachusetts Historical Commission
	Rhode Island Department of Environmental Management
Federal agencies	NPS

Participants in the Section 106 Process	Participating Consulting Parties
	U.S. Army Corps of Engineers, New England District
	U.S. Army Corps of Engineers, New York District
	Office of the Deputy Assistant Secretary of the Navy for Environment (DASN(E))
	Naval Facilities Engineering Systems Command Headquarters–Cultural Resources
	Naval History and Heritage Command – Underwater Archaeology Branch
	U.S. Department of Defense - Office of the Deputy Assistant Secretary of Defense (Environment), Environmental Compliance and Planning
	U.S. Department of Defense - Office of the Assistant Secretary of Defense for Sustainment
	Advisory Council on Historic Preservation
	U.S. Coast Guard -Sector SE New England
	U.S. Coast Guard - Marine Transportation Systems (CG-5PW)
	Bureau of Safety and Environmental Enforcement
	Environmental Protection Agency
	Federal Aviation Administration
Federally recognized Tribal Nations	Mashpee Wampanoag Tribe
	Shinnecock Indian Nation
	Mashantucket Pequot Tribal Nation
	Wampanoag Tribe of Gay Head (Aquinnah)
	Mohegan Tribe of Indians of Connecticut
	Narragansett Indian Tribe
	Delaware Tribe of Indians
	The Delaware Nation
Non-federally recognized Tribal Nations	Chappaquiddick Tribe of Wampanoag Nation
	Unkechaug Nation
Local governments	City of Newport
	County of Dukes (MA)
	Town of Charlestown
	Town of East Hampton
	Town of Middletown
	Town of Nantucket
	Nantucket Planning & Economic Development Commission
	Town of Narragansett
	Town of North Kingstown
	Town of New Shoreham
Nongovernmental organizations or groups	Balfour Beatty Communities
	Block Island Historical Society
	Gay Head Lighthouse Advisory Committee
	Newport Restoration Foundation
	The Preservation Society of Newport County
	Rhode Island Historical Society
	Salve Regina University

Participants in the Section 106 Process	Participating Consulting Parties
	Southeast Lighthouse Foundation
	Revolution Wind, LLC (lessee)

Table 3. Parties Invited to Consult under Section 106 and that Did Not Participate Consultation

Participants in the Section 106 Process	Participating Consulting Parties
SHPOs and state agencies	Massachusetts Board of Underwater Archaeological Resources
	Massachusetts Commissioner on Indian Affairs
Federal agencies	U.S. Fish and Wildlife Service
	National Oceanic and Atmospheric Administration – Habitat and Ecosystem Services Division
Non-federally recognized Tribal Nations	The Golden Hill Paugussett
	Eastern Pequot Tribal Nation
	Schaghticoke Tribal Nation
Local Government	Cape Cod Commission
	City of Cranston
	City of East Providence
	City of Fall River
	City of New Bedford
	City of Providence
	City of Rehoboth
	City of Taunton
	County of Barnstable (MA)
	County of Bristol (MA)
	County of Plymouth (MA)
	County of Suffolk (NY)
	Town of Acushnet
	Town of Aquinnah
	Town of Barnstable
	Town of Barrington
	Town of Berkley
	Town of Bourne
	Town of Bristol
	Town of Chilmark
	Town of Coventry
	Town of Dartmouth
	Town of Dighton
	Town of East Greenwich
	Town of Edgartown
	Town of Exeter
	Town of Fairhaven
	Town of Falmouth
	Town of Freetown
	Town of Gosnold
	Town of Griswold

Participants in the Section 106 Process	Participating Consulting Parties
	Town of Groton
	Town of Hopkinton
	Town of Jamestown
	Town of Johnston
	Town of Lakeville
	Town of Ledyard
	Town of Little Compton
	Town of Marion
	Town of Mashpee
	Town of Mattapoisett
	Town of Middleborough
	Town of North Stonington
	Town of Oak Bluffs
	Town of Portsmouth
	Town of Richmond
	Town of Rochester
	Town of Sandwich
	Town of Scituate
	Town of Seekonk
	Town of Somerset
	Town of South Kingstown
	Town of Southold
	Town of Stonington
	Town of Swansea
	Town of Tisbury
	Town of Tiverton
	Town of Voluntown
	Town of Wareham
	Town of Warren
	Town of Warwick
	Town of West Greenwich
	Town of West Tisbury
	Town of West Warwick
	Town of Westerly
	Town of Westport
Nongovernmental Organizations or Groups	Alliance to Protect Nantucket Sound
	Bristol Historical and Preservation Society
	East Greenwich Historic Preservation Society
	Martha's Vineyard Commission
	Montauk Historical Society
	Newport Historical Society
	Preservation Massachusetts
	Balfour Beatty Communities

DRAFT

ATTACHMENT 5 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM ANCIENT SUBMERGED LANDFORMS, OUTER CONTINENTAL SHELF, FEDERAL AND RHODE ISLAND WATERS OF RHODE ISLAND SOUND

[Insert ATTACHMENT 5 – TREATMENT PLAN ANCIENT SUBMERGED LANDFORM FEATURES]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Ancient Submerged Landforms
Outer Continental Shelf, Federal and Rhode Island State Waters of Rhode Island Sound

Submitted to:

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island State Waters
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Ancient Submerged Landforms, Outer Continental Shelf and Rhode Island State Waters
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
ASLF	Ancient Submerged Landforms
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MARA	Marine Archaeological Resources Assessment
MOA	Memorandum of Agreement
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
OCS	Outer Continental Shelf
RFP	Request for Proposals
ROD	Record of Decision
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
SOI	Secretary of the Interior
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for Ancient Submerged Landforms (ASLF), which are recommended as eligible for listing on the National Register of Historic Places (NRHP) (the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the Marine Archaeological Resources Assessment (MARA), dated July 2021 (SEARCH, 2021) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable (RWEC) Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (EDR, 2021) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions and Historic Significance**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

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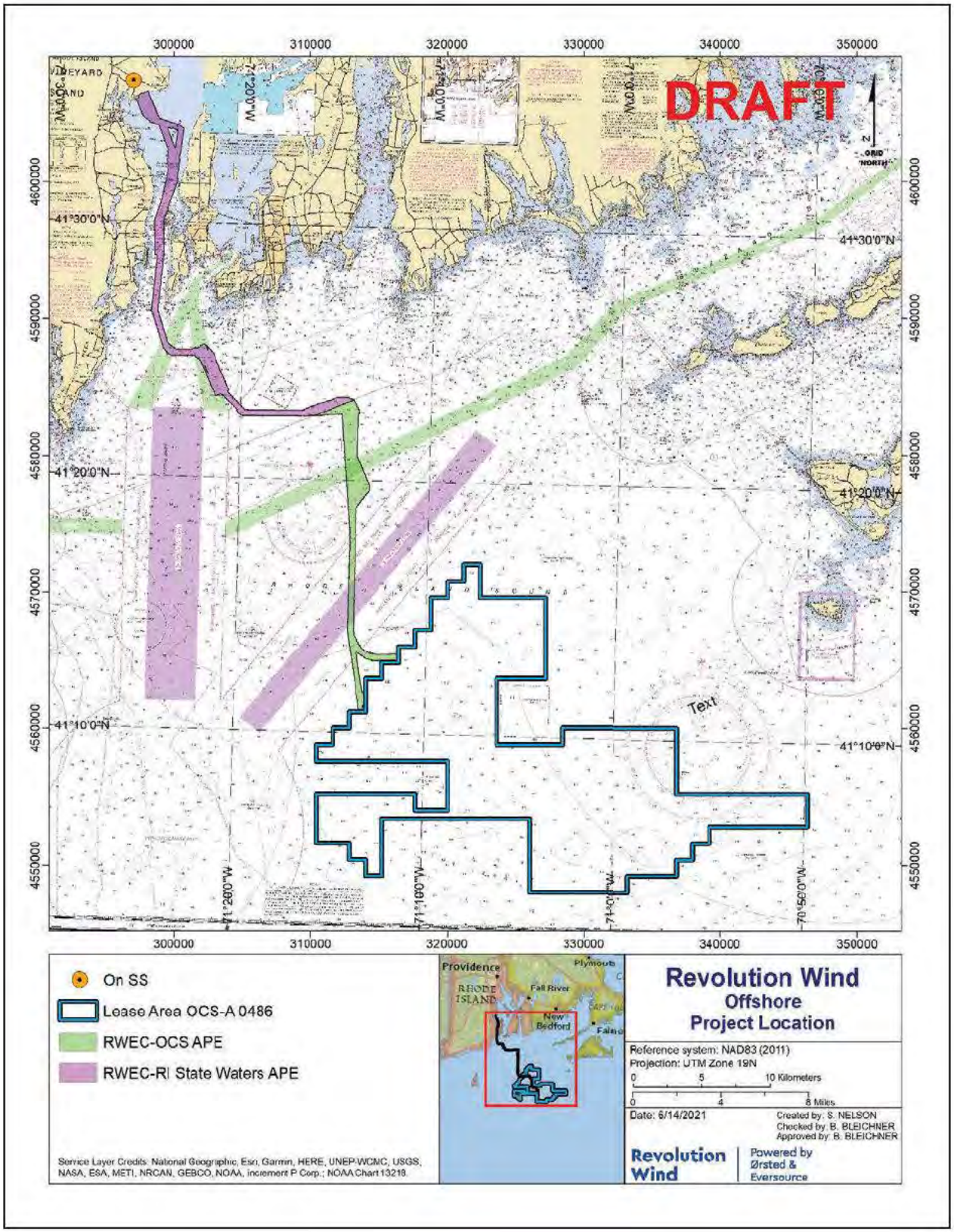
2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the *Marine Archaeological Resource Assessment*. This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state, and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- Mashantucket Pequot Tribal Nation;
- Mohegan Tribe of Indians;
- Narragansett Indian Tribe;
- Shinnecock Indian Nation;
- Wampanoag Tribe of Gay Head (Aquinnah);
- Mashpee Wampanoag Tribe; and
- Historical Chappaquiddick Tribe of the Wampanoag Nation.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

3.1 Historic Properties

This HPTP involves seven historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Property included in the ASLF HPTP

Name	Municipality	State	Site No. (Agency)	Ownership
Target 21	N/A	RI	N/A	State waters
Target 22	N/A	RI	N/A	State waters
Target 23	N/A	N/A	N/A	Federal waters
Target 24	N/A	N/A	N/A	Federal waters
Target 25	N/A	N/A	N/A	Federal waters
Target 26	N/A	N/A	N/A	Federal waters
Target 28	N/A	N/A	N/A	Federal waters

Figure 3.1-1. Historic Property Location

**(map detached:
contains material that meets the criteria for confidentiality under Section 304 of the NHPA)**

In Section 3.2, the historic properties are described both physically and within their historic contexts, with a focus on the potential of each to yield information important to prehistory and their potential traditional cultural significance to multiple Native American tribes.

3.2 Ancient Submerged Landform

3.2.1 Physical Description and Existing Conditions

Target 21



Based on a worst-case scenario for export cable alignment relative to the shallow portions of the ASLF, Revolution Wind estimates that roughly 3.6 percent of Target 21 could be disturbed by cable construction activities.

Target 22



Based on a worst-case scenario for export cable routing, Revolution Wind estimates that approximately 3.5 percent of Target 22 could be disturbed by cable construction activities. Actual impacts, if any, will likely be of a lower magnitude based on the location of the feature along the outer margins of the survey corridor.

Target 23



Based on a worst-

case scenario for export cable routing, Revolution Wind estimates that approximately 1.9 percent of Target 23 could be disturbed by cable construction activities. Actual impacts, if any, will likely be of a lower magnitude based on the location of the feature along the outer margins of the survey corridor.

Target 24

[redacted]

arget 24 can likely be avoided; however Revolution Wind assumed a worst-case scenario for IAC alignment and estimates that up to 9.1 percent of the shallow portions the ASLF could be impacted by cable construction activities.

Target 25

[redacted]

Two WTGs are located within the boundaries of Target 25 and complete avoidance of the ASLF may not be feasible. Shallow deposits that could be disturbed by IAC construction are limited to the southeastern periphery of the landform. In a worst theoretical case scenario, up to 2.7 percent of Target 25 could be affected by IAC and WTG construction activity.

Target 26

[redacted]

No WTGs are planned within the feature limits and no IAC alignments intersect the shallow sections of ASLF. Avoidance of Target 26 is likely feasible. Based on a worst theoretical case scenario for IAC routing, Revolution Wind estimates up to 2.7 percent of Target 26 could be affected by Project construction activities.

Target 28 [redacted] As currently designed, WTG foundations will not be sited within Target-28 and nearly the entire feature falls below the anticipated maximum vertical extent of impact (i.e. 4.6 m [15 ft]) associated with installation of the IACs. Preservation of potentially intact alluvial deposits that could be disturbed by IAC construction are limited to the extreme eastern and southwestern margins of the feature. Avoidance of Target 28 is likely feasible.

3.2.2 Historic Context

Based on radiocarbon data collected for the MARA analyses and detailed reconstructions of the paleolandscapes within the APE, the identified ASLF included in this treatment plan are associated with terminal Pleistocene era incisions of the former Glacial Lake Rhode Island basin following drainage of the former pro-glacial lake by approximately 15,500 cal. B.P. Drainage of the lake occurred when a sediment dam between Block Island and Cox Ledge was breached, causing catastrophic flooding on the portions of the Outer Continental Shelf (OCS) southwest of Revolution Wind and extensive erosion of the former lake bottom in the area of the RWF and southern sections of the RWEC (Cacciopolli, 2015). [redacted]

[redacted] No direct evidence of human use of these locations has been recovered, but the settings of each are consistent with terrestrial locations used by indigenous peoples in the northeastern United States after 13,000 cal. B.P. [redacted] Current models for Paleoindian settlement and subsistence patterns indicate people living in the region between approximately 13,000 and 11,000 years ago were highly mobile. Reported Paleoindian site locations occur in a wide range of environmental [redacted].

It is important to note that very little is known about potential coastal adaptations during this time period. The submerge continental shelf contains the vast majority of coastal habitats that would have been available to people living in the region more than 12,000 years ago. Practical and technological challenges have limited the range of surveys that might yield direct evidence of now-submerged coastal sites. Where terminal Pleistocene or very early Holocene coastal sites have been identified elsewhere in North America, those sites have yielded different types of stone tools than typically associated with Paleoindian sites in the Northeast. As such, it is plausible that archaeological expressions of Pleistocene coastal occupations in the New England region may look quite different than their counterparts in the interior sections (now on the mainlands).

[redacted] As shared with Revolution Wind by tribal representatives, several of the consulting tribes' traditions hold that their people have always been here. They did not migrate from ancient Asia or Europe or anywhere else. Their origins are rooted here, in the Northeast, and at the interface between the seas and lands. Important events in tribal histories occurred on the OCS and preserved elements of the ancient landscapes with which their ancestors and culture heroes interacted are important.

3.2.3 NRHP Criteria

Based on prior BOEM consultations for the South Fork Wind Farm and Vineyard Wind 1 Wind Farm undertakings and Revolution Wind's assessments, the identified ASLF are potentially eligible for listing in the National Register of Historic Places under Criterion D for their potential to yield important information [redacted]. Each ASLF may also be eligible for listing under Criterion A [redacted]

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. The conceptual mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior (SOI) Qualifications Standards for Archeology and/or History (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project. NRHP-qualifying characteristics of each historic property that would be affected. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review by consulting parties.

4.1 Target 21, Target 22, Target 23, Target 24, Target 25, Target 26 and Target 28

4.1.1 Preconstruction Geoarchaeology

4.1.1.1 Purpose and Intended Outcome

This mitigation measure will consist of the collection vibracores within the affected portions of each ASLF prior to Project construction. The collected cores, the locations which will be selected in consultation with Native American tribes, will be analyzed in collaboration with the tribes to provide a more detailed understanding of ancient terrestrial landscapes along the RWEC and within the RWF [redacted]. Data acquired from this effort is expected to refine the age estimates for each stable landform, the timing and character of ecological transitions evidenced in the MARA research and provide an additional opportunity to recover evidence of ancient indigenous use of each ASLF.

This measure will provide for a more detailed analysis of the stratigraphy, chronology, and evolving ecological conditions at each ancient landform. Two separate reports on the analyses and interpretations will be developed. The first will be focused on content of specific interest the consulting tribes, including a broad approach to integrating available data collected from other recent archaeological research and surveys on the Atlantic OCS. The specific content and formatting of this report will be refined in consultation with the tribes to align the work product with intended intra- and inter-tribal audiences. The second report will be geared primarily toward technical, Tribal/State Historic Preservation Officer and agency audiences.

4.1.1.2 Scope of Work

The scope of work will consist of the following:

- Collaborative review of existing geophysical and geotechnical data with Native American tribes
- Selection of coring locations in consultation with tribes;
- Collection of two to three vibracores within each affected ASLF with a sampling focus on areas that will be disturbed by Project construction activities;
- Written verification to BOEM that the samples collected are sufficient for the planned analyses and consistent with the agreed scope of work;
- Collaborative laboratory analyses at a laboratory located in Rhode Island or Massachusetts;
- Screening of recovered sediments for debitage or microdebitage associated with indigenous land uses;

- Third-party laboratory analyses, including micro- and macro-faunal analyses, micro- and macro-botanical analyses, radiocarbon dating of organic subsamples, and chemical analyses for potential indirect evidence of indigenous occupations;
- Temporary curation of archival core sections
- Draft reports for review by participating parties;
- Final reporting; and
- Public or professional presentations summarizing the results of the investigations, developed with the consent of the consulting tribes.

4.1.1.3 Methodology

Revolution Wind will conduct the Preconstruction Geoarchaeology in consultation with the participating parties. The research, analyses, and interpretations are intended to be a collaborative effort with the consulting tribes. The research will be conducted in collaboration with the consulting Native American tribes, who will be invited by Revolution Wind to series of working sessions to:

- Review existing data;
- Develop specific research questions addressing the tribes' interests in the ASLF;
- Select candidate coring locations;
- Split, document, and sample recovered vibracores in the laboratory;
- Review analytic results and preliminary interpretations; and
- Review draft reporting.

Vibracores placed within the affected sections of each ASLF will extend a maximum depth of approximately 20 feet (6 meters) below the sea floor. The cores will be cut on the survey vessel into approximately 1-meter-long sections and sealed to minimize the risk of environmental contamination. The core segments will be logged on the survey vessel and a chain of custody will be maintained to ensure all samples are accounted for and that all samples are transferred to the laboratory for geoarchaeological analyses. Once the core segments are transferred to the Qualified Marine Archaeologist, Revolution Wind will invite tribal representatives to participate in the splitting, documentation, and subsampling of each core. Each core segment will be split longitudinally into working and archival halves. Subsamples collected from working halves for specific third-party analyses will be packaged in a manner appropriate to the specific analysis for which they are intended. Archival halves will be sealed and stored horizontally on shelves or racks in a climate-controlled facility for at least one year following completion of laboratory analyses. Revolution Wind will prioritize reasonable access to archival core segments by Consulting Parties when selecting the storage facility. All samples collected from the working halves will be submitted to third party laboratories within approximately 6 months of core transfer to the Qualified Marine Archaeologist facilities.

Revolution Wind will prepare a presentation of the preliminary results and interpretations for discussion with the Tribes (see work session schedule above). Revolution Wind will consider the Tribes' comments and suggestions when preparing the draft reports and will seek to resolve any disagreements among the parties through supplemental consultations prior to preparing the draft reports.

Revolution Wind will submit the draft reports to the participating parties for review and comment. Revolution Wind will consider all comments received when developing the final reports. Final digital copies of the completed reports will be provided to all participating parties. Hard copies of the final reports will be submitted to the State Historic Preservation Officers, tribes or other parties upon request.

Following the one-year retention period, Revolution Wind will offer transfer of the archival core segments to the Consulting Tribes, SHPOs and related state agencies, and regional research institutions with an interest in and capacity to conduct further analyses. Revolution Wind currently anticipates research institutions with potential interests/capacities to include the University of Rhode Island, University of Connecticut, and Eastern Connecticut State University. Revolution Wind will notify the Consulting Parties of its intent to transfer archival core segments to any party at least 45 days prior to initiating such transfer and will consider any comments provided by Consulting Parties before proceeding. If no external parties agree to accept the archival core segments, Revolution Wind will water-screen the retained segments to identify and collect potential physical evidence of ancient Native American activity at the ASLFs. In such circumstances, Revolution Wind will prepare a technical memorandum summarizing the results of the archival core segment processing and analyses and submit that memorandum to the Consulting Parties.

4.1.1.4 Standards

The Preconstruction Geoarchaeology effort will be conducted in accordance with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (May 2020). The qualified professional archaeologists leading the research will meet the SOI professional qualification standards for archeology (62 FR 33708) and BOEM's standards for Qualified Marine Archaeologists.

4.1.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Draft Tribal Audience Report;
- Draft Technical Report;
- Final Tribal Audience Report;
- Final Technical Report; and
- Draft Public or Professional Presentations.

4.1.1.6 Funds and Accounting

Revolution Wind will be responsible for funding and implementation of this mitigation measure.

4.1.2 Open-Source GIS and Story Maps

4.1.2.1 Purpose and Intended Outcome

This mitigation measure will consist of the compilation and transfer of relevant geophysical, geotechnical, and geoarchaeological datasets pertaining to the ASLF to a non-proprietary GIS system for use by Native

American tribes. The datasets will include subbottom (seismic) data used to characterize the seabed and ASLF features, the location of all geotechnical/geoarchaeological samples collected, and the vertical and horizontal extents of the affected features or sub-features within each ASLF. The GIS will be, to the extent feasible and practicable, compatible with GIS datasets compiled for other OCS projects to assist in the tribes' on-going research and stewardship efforts. Story Maps or equivalent digital media presentations will be prepared to integrate and present the complex technical data compiled during the MARA and mitigation investigations in a manner best-suited for inter- and intra-tribal audiences. Story Map content would be developed in close consultation and collaboration with the consulting Native American tribes.

Incorporation of Revolution Wind datasets into a broader GIS framework will allow the tribes to better understand and protect preserved elements of the ancient submerged landscapes of traditional cultural significance. The intent of this measure is to enhance the Tribes understanding of existing conditions for a range of ASLFs located in the northeastern Atlantic OCS. This knowledge would allow for more effective Government to Government consultations regarding similar features that may be affected by future federal undertakings. The value of the GIS will increase as additional datasets are acquired and incorporated. Access to the GIS will support each Tribes' capacity to pursue their own research or intra-tribal educational programs related to the OCS and traditional cultural uses [redacted] Integrated GIS that can accommodate datasets collected from other OCS development projects and surveys would allow for comparisons to areas south of the maximum glacial limits on the OCS to provide a more comprehensive view of the ancient landscapes within the region. Revolution Wind will provide reasonable compensation to tribal representative working with Revolution Wind on implementation of this measure. Story Maps created within the GIS will provide a flexible approach to incorporating media from a variety of sources, including geospatial data, interviews with traditional knowledge-holders, photographs, audio recordings, and archival cartography for a compelling interpretive experience. Story Maps can be tailored for specific tribal audiences and uses and would be developed in consultation with the consulting tribes.

4.1.2.2 Scope of Work

The scope of work will consist of the following:

- Consultation with the Tribes to determine the appropriate open-source GIS platform;
- Review of candidate datasets and attributes for inclusion in the GIS;
- Data integration;
- Development of custom reports or queries to assist in future research or tribal maintenance of the GIS;
- Work Sessions with Tribes to develop Story Map content;
- Training session with Tribes to review GIS functionality;
- Review of Draft Story Maps with Tribes;
- Delivery of GIS to Tribes; and
- Delivery of Final Story Maps.

4.1.2.3 Methodology

Revolution Wind will develop the GIS in consultation with the Participating Parties. At least one work session will be scheduled to refine specific functionality of interest to the Tribes. That session will be conducted after the preliminary data analyses for the Preconstruction Geoarchaeology effort has been completed. This will allow for a more focused walk-through of the data and options for organizing and integrating different datasets. Revolution Wind will request from the Tribes details on any existing open-source GIS systems currently in use by each Tribe to minimize any issues with data integration or interoperability. Once the work session has been conducted Revolution Wind will proceed with development of the GIS, taking into account the Tribes' comments and suggestions. The draft GIS system will be shared with the Tribes in a training session that presents the functions of the GIS and familiarizes the tribal representatives with the interfaces, data organization, and any custom features developed to enhance useability. Revolution Wind will consider any feedback from the Tribes on the draft GIS before proceeding with finalizing the system design and implementation. Revolution Wind will provide the GIS to the Tribes by physical storage media or as a secure digital file transfer, as appropriate to each Tribes IT infrastructure and preference. Revolution Wind does not intend to be responsible for the upkeep of the GIS database.

Story Map content will be developed with the consulting Tribes through one or more scheduled work sessions. Potential options for content intended for youth audiences, tribal governments, and/or general tribal membership will be discussed to refine the conceptual framework and develop draft Story Maps for review by the Tribes. Revolution Wind will consider all comments and feedback provided by the Tribes when preparing the final Story Maps.

4.1.2.4 Standards

The GIS developed under this measure will be free to use and free to modify by the tribes. To the extent feasible, all data will be provided in formats that allow for interoperability with other GIS platforms that the tribes may use. All datasets incorporated in the GIS will comply with Federal Geographic Data Committee data and metadata standards.

4.1.2.5 Documentation

Revolution Wind will provide draft descriptions and documentation of the GIS for review by the Participating Parties and will provide a description of the draft Story Maps to the consulting Tribes following the initial working sessions.

The following documentation is to be provided for review by Participating Parties:

- Draft Description of the GIS with appropriate schema, data organization, and custom reports/queries;
- Draft Story Map descriptions with details on content, formatting, and intended audiences; and
- Final Technical Description of the GIS with schema, data organization, and custom reports/queries.

4.1.2.6 Funds and Accounting

Revolution Wind will be responsible for funding and implementation of this mitigation measure.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA Substitution schedule for Revolution Wind Farm, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between);[2]
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between);
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties;
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS;
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between);
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between);
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between);
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between);
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between);
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between);
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS);
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS;
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM;

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Marine Archaeological Resources, January 24, 2022; and
- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Marine Archaeological Resources, February 9, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA Substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 6 – HISTORIC PROPERTY TREATMENT PLAN FOR THE REVOLUTION WIND FARM, THE [redacted] #1 AND #2 SITES, TOWN OF NORTH KINGSTOWN, WASHINGTON COUNTY, RHODE ISLAND

[Insert ATTACHMENT 6 – TREATMENT PLAN TERRESTRIAL HISTORIC PROPERTIES THAT WILL BE ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review and Comment by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The [redacted] #1 and #2 Sites, Town of North Kingstown, Washington County, Rhode Island

Submitted to:

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Adverse Physical Effect Finding for:	The [redacted] #1 and #2 Sites,
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
cmbgs	centimeters below ground surface
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MOA	Memorandum of Agreement
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
QDC	Quonset Development Corporation
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
RI SHPO	Rhode Island State Historic Preservation Officer
ROD	Record of Decision
RWF	Revolution Wind Farm
STP	shovel test pit
THPO	Tribal Historic Preservation Officer
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for two archaeological historic properties, the [redacted] #1 and #2 Sites (the historic properties) provides background data, resource-specific information, and detailed steps that will be implemented to carry out the mitigation actions identified by the applicant in the *Terrestrial Archaeological Resources Assessment and Site Identification Survey, Revolution Wind Farm Project, Onshore Facilities* (TARA) dated August 2021 (PAL, 2021) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind, LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for these historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.

[1] The timeline is subject to change and is based on current available information

- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the *Historic Resources Visual Effects Analysis – Revolution Wind Farm* (EDR, 2021) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions and Historic Significance**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Onshore Facilities Regional Location

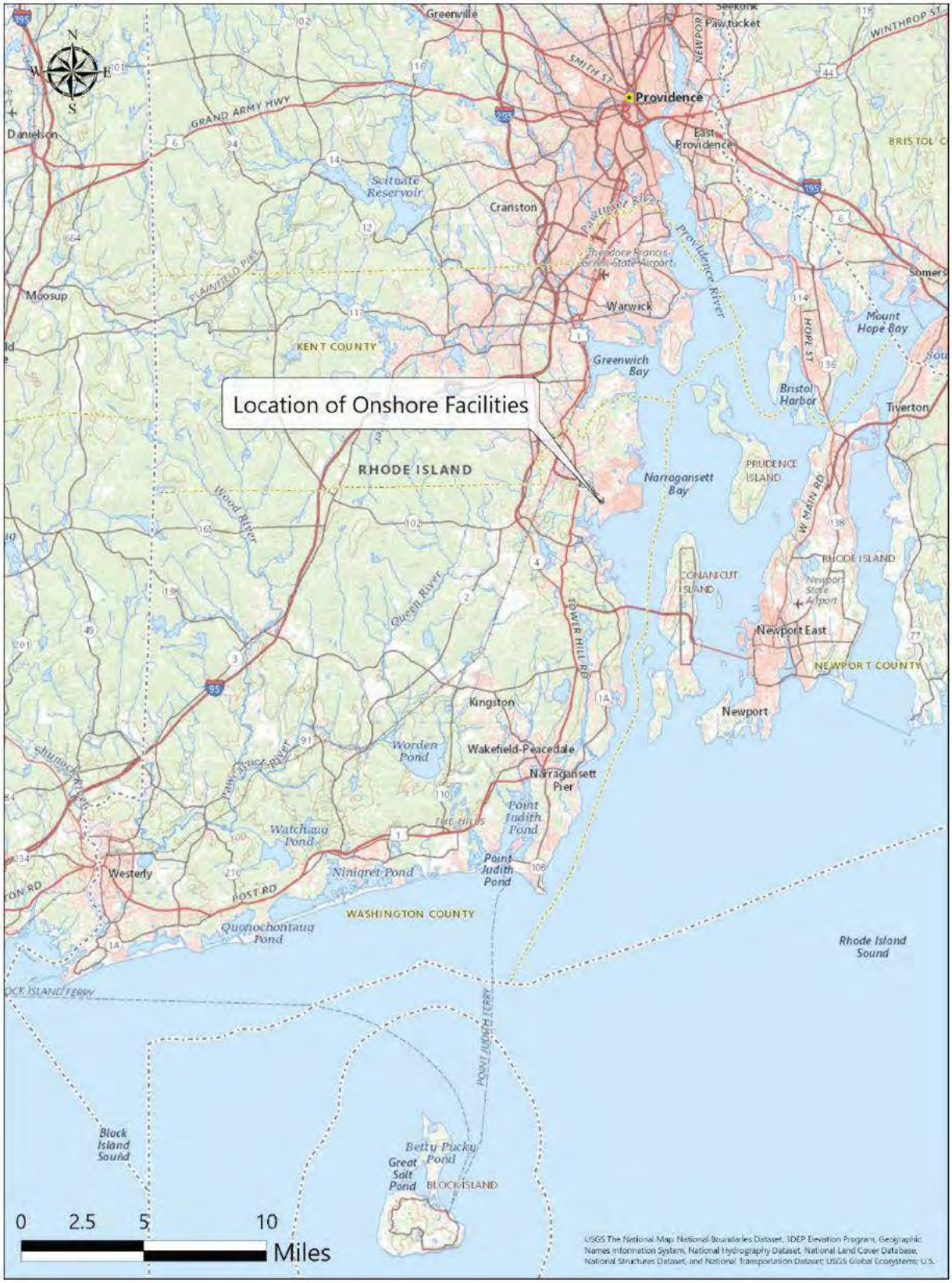
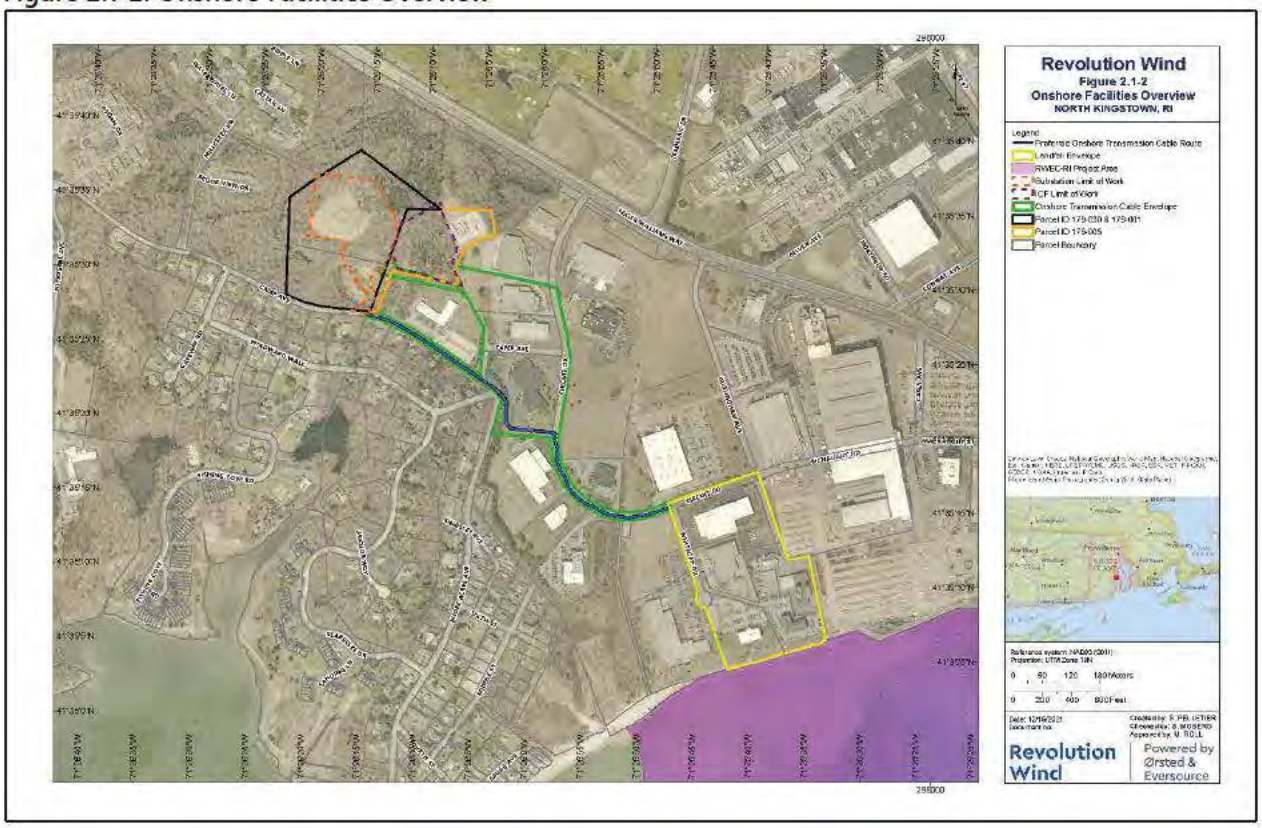


Figure 2.1-2. Onshore Facilities Overview



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act

This HPTP was developed in accordance with the TARA and COP and reflects consultations conducted by BOEM with multiple consulting parties, including the Rhode Island State Historic Preservation Officer (RI SHPO), the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head/Aquinnah, Mashpee Wampanoag, Shinnecock Indian Nation and Mashantucket Pequot Historic Preservation Offices (THPOs). The regulations at 36 CFR § 800.8 provide for use of the National Environmental Policy Act (NEPA) process to fulfill a Federal agency's National Historic Preservation Act (NHPA) Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a Record of Decision (ROD) and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the National Historic Preservation Act.

The measures to avoid and minimize adverse effects to identified historic properties are described in the *Terrestrial Archaeological Resources Assessment and Site Identification Survey.*

This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind. That

framework identified the following measures as appropriate means of resolving adverse effects to the [redacted] #1 and #2 Sites:

a. Data recovery investigations to document and recovery critical information regarding [redacted] the affected sites.

   i. All excavations would be conducted under a permit issued by the Rhode Island Historical Preservation & Heritage Commission.

   ii. Excavations are intended to extend over approximately 20% of the affected section of each site.

   iii. The research design and specific research questions to be addressed through field research and laboratory analyses will be developed in consultation with the consulting Native American Tribes.

   iv. Representatives from the consulting Native American Tribes will be invited to monitor the field investigations and participate in the interpretation of data collected.

b. Technical reports for peer review and dissemination of data at professional conferences/publications.

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its Record of Decision (ROD) and with applicable state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- RI SHPO;
- The Narragansett Indian Tribe THPO;
- The Wampanoag Tribe of Gay Head/Aquinnah THPO;
- The Mashpee Wampanoag Tribe THPO;
- The Mashantucket Pequot Tribal Nation THPO; and
- The Shinnecock Indian Nation THPO.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

This HPTP provides details and specifications for mitigation measures to resolve the adverse effects within the APE for the [redacted] #1 and #2 Sites.

3.0 EXISTING CONDITIONS AND HISTORIC SIGNIFICANCE

3.1 Historic Properties

The HPTP involves two historic properties, as identified in 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Resources included in the HPTP

Name	Municipality	State	Site No.	Property Designation	Ownership
The [redacted] #1 Site	North Kingstown	RI		Recommended NRHP-eligible	[redacted]
The [redacted] #2 Site	North Kingstown	RI		Recommended NRHP-eligible	[redacted]

Figure 3.1-1. [redacted] #1 and #2 Site Locations

(detached:
contains material that meets the criteria for confidentiality under Section 304 of the NHPA)

In Section 3.22 and 3.33, each historic property is individually considered, described both physically and historically. Information on each historic property, relevant historic context, and potential NRHP eligibility is summarized from the *Terrestrial Archaeological Resources Assessment and Site Identification Survey* (TARA; PAL, 2021) prepared in support of the Undertaking's COP submittal to BOEM.

3.2 The [redacted] #1 Site

3.2.1 Physical Description and Existing Conditions

[redacted]

Soils within the [redacted] #1 Site were documented as mostly intact/undisturbed by 19 archaeological shovel test pits (STPs) conducted in June and July 2021 as part of PAL's archaeological survey. In profile, the soils appeared as an organic layer (A_o) overlying a silty sand A horizon. The A horizon was underlain by medium-coarse sand B1 and B2 horizons, overlying an oxidized, coarse sand C horizon. [redacted]

[redacted]

Table 3.2-1. [redacted] Cultural Materials by Stratum, the [redacted] #1 Site

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3.2.2 Historic Context

[redacted]

[redacted]

[redacted]

[redacted]

The [redacted] nineteenth- and twentieth-century history of the vicinity of the [redacted] #1 Site is marked by little to no development of the area until rapid transformation of the landscape began during construction of World War II-era military facilities. [redacted] Portions of the area [redacted] were used by the Navy as a general landfill from approximately 1949 to 1953 and again up to 1970. Earth moving activity [redacted] is suggested by bare soil exposure in aerial photography from 1960 and 1970. [redacted]

Remediation activities at the former landfill/dump between 1997 and 1998 removed several hundred tons of tires, asphalt, concrete, scrap metal and wood debris, and contaminated soils (VHB, 2019).

3.2.3 NRHP Criteria

[redacted]

[redacted] In the TARA (PAL, 2021), PAL recommended the [redacted] #1 Site as eligible for listing in the NRHP under Criterion A and D.

3.3 The [redacted] #2 Site

3.3.1 Physical Description and Existing Conditions

[redacted]

Soils within the [redacted] #2 Site were documented as intact/undisturbed by nine STPs conducted in June and July, 2021 as part of PAL's archaeological survey. In profile, the soils appeared as an organic layer (Ao) overlying a silty sand A horizon. The A horizon was underlain by a silty fine-medium sand B1 horizon, which was in turn underlain by a silty medium-coarse sand B2 horizon. The B horizons were overlying a medium-coarse sand and gravel C horizon.

[redacted]

Table 3.3-1. [redacted] Cultural Materials by Stratum, the [redacted] #2 Site

[redacted]

3.3.2 Historic Context

[redacted]

3.3.3 NRHP Criteria

[redacted] In the TARA (PAL, 2021), PAL recommended the Creek Swamp #2 Site as eligible for listing in the NRHP under Criterion A and D.

4.0 MITIGATION MEASURES

Revolution Wind recognizes the significance of the [redacted] #1 and #2 Sites and is committed to avoiding or minimizing impacts to these sites to the extent feasible. This HPTP addresses the mitigation requirements identified by BOEM to resolve the remaining adverse effects. The mitigation measures for the [redacted] #1 and #2 Sites (detailed below) reflect consultations among consulting parties to refine a conceptual mitigation framework proposed by Revolution Wind. BOEM and Revolution Wind have identified steps to implement these measures in consultation with Participating Parties, led by individuals who meet the qualifications specified in the Secretary of the Interior's Qualifications Standards for Archaeology (36 CFR 61) and have demonstrated experience in the interpretation of Precontact Period archaeological sites in the Northeast region.

4.1 The [redacted] #1 Site & [redacted] #2 Site

4.1.1 Data Recovery Investigations

4.1.1.1 Purpose and Intended Outcome

This HPTP proposes to complete Phase III data recovery investigations within the affected sections of the sites to document and recover critical information [redacted]. The intended outcome is to provide funding to a Secretary of the Interior's Qualifications Standards for Archaeology (36 CFR 61) qualified consultant to conduct a data recovery investigation within the affected sections of the historic properties.

4.1.1.2 Scope of Work

The scope of work will consist of the following:

- The preparation of a Phase III Work Plan for submission and review by the Rhode Island State Historic Preservation Officer (RI SHPO), BOEM and THPOs that specifies the scope of the proposed Phase III investigation;
- Field investigation of approximately 20% of the affected sections of both historic properties, including a mix of STPs and 1x1-meter excavation units (EUs) to document the stratigraphic integrity of the site, [redacted];
- Feature documentation and excavation; and
- Artifact recovery, processing, and analysis.

4.1.1.3 Methodology

The research design and specific research questions to be addressed through field research and laboratory analyses will be developed in consultation with the RI SHPO and the Participating Parties. Representatives from the consulting Native American Tribes will be invited to monitor the field investigations and participate in the interpretation of data collected. Excavations are anticipated to include up to 20 percent of the affected sections of the historic properties in order to provide a representative sample of cultural materials and to support detailed analyses.

4.1.1.4 Standards

The project will comply with the following standards:

- Rhode Island Historical Preservation & Heritage Commission's (RIHPC) *Standards for Archaeological Survey* (the *Standards*; RIHPC, 1982); and
- Rhode Island Historical Preservation & Heritage Commission's (RIHPHC) Performance Standards and Guidelines for Archaeology in Rhode Island (the Guidelines, 2021).

4.1.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Phase III Work Plan;
- Draft Phase III Archaeological Data Recovery Report; and
- Final Phase III Archaeological Data Recovery Report.

4.1.1.6 Reporting

The results of the Phase III data recovery investigations will be presented in a Phase III illustrated report prepared in accordance with the *Standards* (RIHPHC, 1982). The report will include the results of the Phase III field investigations, artifact analyses, appropriate maps, photographs, and illustrations, and conclusion regarding significance. It is anticipated that the Phase III report will include the following sections:

1. Introduction: The report will describe the purpose and goals of the investigation and describe the proposed development/construction within the historic properties.
2. Project Background: The report will include a summary of the TARA (PAL, 2021), as well as a summary of correspondence with involved state and federal agencies and Participating Parties.
3. Research Design/Research Questions: The Phase III report will include the research design and specific research questions to be addressed by data recovery and analysis at each site.
4. Field Investigations: The Phase III report will include a summary of the methods and results of field investigations. This will include:
    - one or more artifact density maps,
    - representative stratigraphic profiles for test units
    - stratigraphic profiles and plan views of all investigated potential features
5. Analyses: The report will include a complete artifact inventory, as well as a synthesis and interpretation of the artifact assemblages recovered, and features documented during the Phase I investigation described in the TARA and the proposed Phase III investigations.
6. Conclusions: The report will offer additional preservation and management recommendations and the need (if any) for additional archaeological investigations.

An electronic copy of the Phase III report will be submitted to the RI SHPO, BOEM, and THPOs for review and comment. Revolution Wind will provide two bound copies of the final report to the RI SHPO reflecting the consideration of all consulting party comments and recommendations.

4.1.1.7 Funds and Accounting

Revolution Wind will be responsible for funding the mitigation measures described herein.

5.0 IMPLEMENTATION

5.1 Timeline

Mitigation measures within this HPTP are to be implemented within one year of its finalization, unless a different timeline is agreed upon by Participating Parties and accepted by BOEM. Revolution Wind Farm and Revolution Wind Export Cable construction activities that do not adversely affect historic properties may proceed prior to completion of the HPTPs.

This section of the HPTP identifies which mitigation measures must be implemented prior to the commencement of construction activities that will adversely affect the specific historic property (or properties) addressed by this HPTP and which measures can be implemented during or after Project construction.

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).

[2] The timeline is subject to change and is based on current available information.

- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106 of the NHPA. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 7 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted], MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF

[Insert ATTACHMENT 7 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan for the Revolution Wind Farm

The [redacted] Traditional Cultural Property [redacted] Massachusetts & Atlantic Outer Continental Shelf

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The [redacted] Traditional Cultural Property (TCP)
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
DEIS	Draft Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
ROD	Record of Decision
RWF	Revolution Wind Farm
SOI	Secretary of the Interior

TCP	Traditional Cultural Property
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the [redacted] Traditional Cultural Property (the historic property), which was determined eligible for listing in the National Register of Historic Places by the Bureau of Ocean Energy Management in 2021, provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
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- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended

outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following party:

- [redacted].

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and depicted on Figure 3.1-1.

Table 3.1-1. Historic Property included in the HPTP

Name	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
The [redacted] TCP	[redacted]	MA	N/A	Multiple	TCP

Figure 3.1-1. Historic Property Location

[redacted]

In Section 3.3 the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

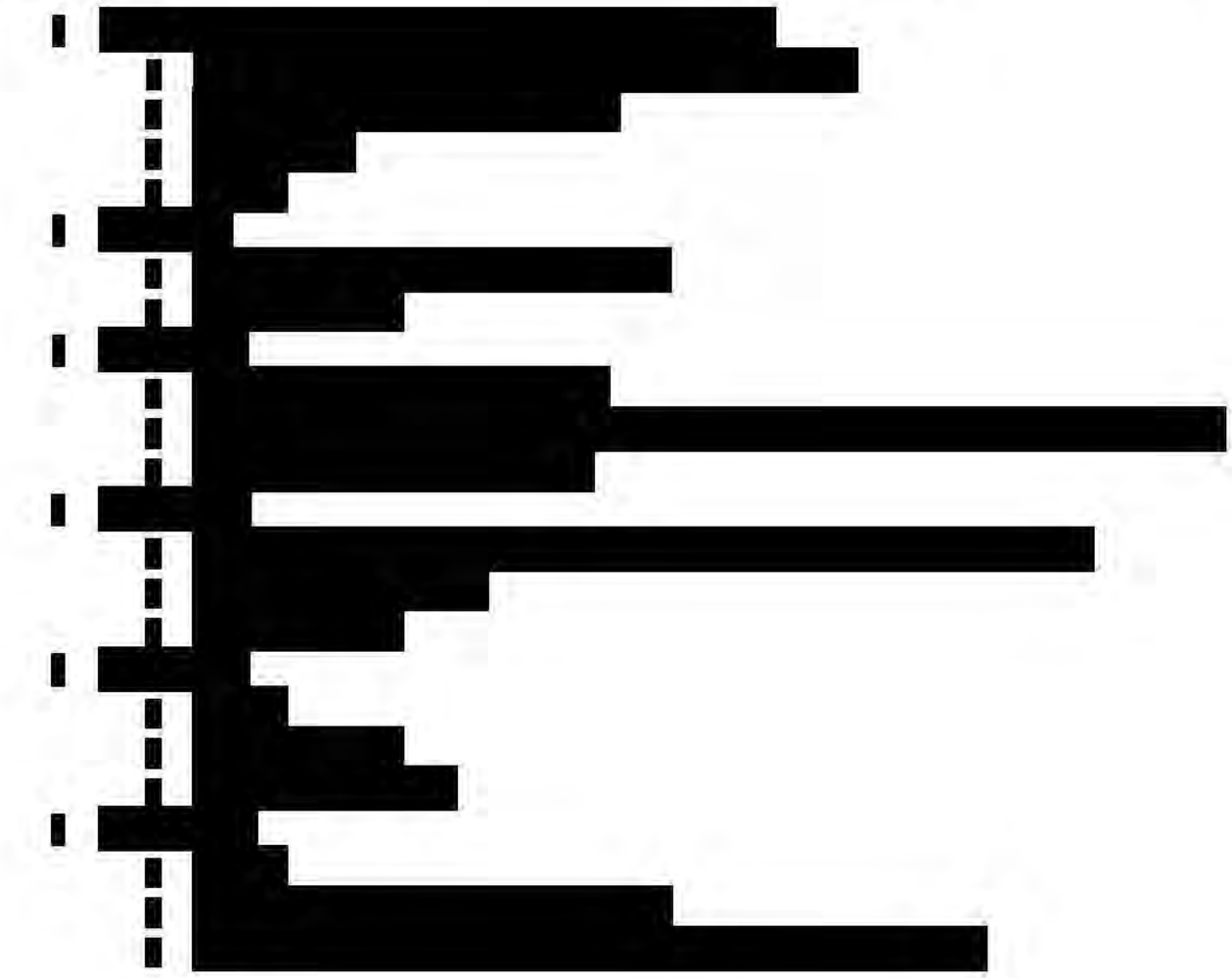
3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

3.3 The [redacted] TCP

[redacted]

[redacted]



3.3.1 Historic Context

[redacted]

[redacted]

[redacted]

[redacted]

3.3.2 NRHP Criteria and the Maritime Visual Setting

BOEM determined the [redacted] TCP is potentially eligible for listing in the National Register of Historic Places under Criterion A [redacted]

The maritime setting of the TCP is integral to its historical and cultural significance. [redacted]

4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior (SOI) Qualifications Standards for Archeology, History, Architectural History and/or Architecture (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 GIS Database of Contributing Resources to the TCP

4.1.1 Purpose and Intended Outcome

Stewardship of the [redacted] TCP is of critical importance [redacted] his HPTP proposes the development of a non-proprietary spatial database of contributing resources and associated physical features to assist in prioritizing preservation efforts and ensure that accurate information is available to support local, state, and federal consideration of TCP impacts in future permitting processes.

A GIS database incorporating the results of on-going documentation of the TCP will be developed and include information on existing conditions at each contributing resource and/or significant element of the TCP district. The GIS will include simple data collection and update interfaces [redacted] to maintain the database and associated records pertaining to the TCP. The GIS will allow for overlays of other publicly available that may assist in identifying sites and places at-risk due to coastal erosion, storm surge, habitat degradation, or other climate change related threats.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Request for Proposals (RFP)[2];
- Proposals by qualified consultants in response to the RFP;
- Preliminary platform, schema, proposed interfaces, and database structures with associated narrative descriptions that accommodate the following mitigation measure (Section 4.2) for review by the Participating Parties;
- Final development and deployment plan for the GIS; and

[2] [redacted] the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

- Development and delivery of the GIS with associated datasets.

Final deliverables produced by the consultant will incorporate further comments and any additional information provided by the participating parties.

4.1.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.1.4 Standards

Documentation will be prepared by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). The GIS will be developed by professionals with demonstrated experience in the creation and organization of spatial databases of cultural resources and the relevant and specific attributes necessary for recordation and management. The GIS development will be overseen by a qualified Geographic Information Systems Professional.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Development of Interpretative Materials

4.2.1 Purpose and Intended Outcome

Development of the TCP GIS database (see Section 4.1) will allow for incorporation of other digital media pertaining to the physical and cultural elements of the historic property in a manner that enhances intra-tribal and extra-tribal appreciation. GIS story maps or comparable presentations could include relevant

archival data, oral histories, news stories, video footage, and public domain datasets [redacted]

The intended outcome of this measure is to support the [redacted] efforts to integrate existing information from disparate sources in a compelling, flexible interpretative format [redacted]. Story maps and comparable presentations would allow [redacted] educational opportunities [redacted], share important information about the TCP [redacted], and tell [redacted] stories in a format that enhances [redacted] understanding and supports effective decision-making for future preservation efforts.

4.2.2 Scope of Work

The scope of work will consist of the following:

- RFPs[3];
- Proposals by qualified consultants in response to the RFP;
- Community charette(s) to select topics to be addressed in story maps or other interpretive exhibits;
- Draft story maps for review and comment by participating parties; and
- Final story maps.

4.2.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Revolution Wind will host a meeting with the Participating Parties to review the draft Story Maps including a walk-through of the user interface, functions and associated media content. Revolution Wind will solicit feedback on the draft work product during the meeting. No more than 30 days following the meeting, Revolution Wind will provide to BOEM and the Participating Parties a summary of the discussions, comments shared, and the steps Revolution Wind will take to incorporate comments in the final work products. Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.2.4 Standards

The GIS media (story maps or other work products) will be developed under the supervision of a qualified Geographic Information Systems Professional. [redacted]

[3] [redacted] the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

[redacted] the work products will be accessible by parties without access to proprietary software and at no cost to the end-user. [redacted] access to sensitive content may be restricted to limited audiences where disclosure would pose a risk to the contributing resources within the TCP or other historic properties.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

4.2.6 Funds and Accounting

It is anticipated that funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Climate Adaptation Planning Study

4.3.1 Purpose and Intended Outcome

Multiple elements of the [redacted] TCP are threatened by coastal erosion, habitat degradation, storm impacts, invasive species and other climate change-related risks. [redacted] The Climate Adaptation Planning Study would assess future threats to elements of the TCP included in the integrated GIS database (see Section 4.1) and define a series of options to mitigate those threats.

The intended outcome of this measure is a Climate Adaptation Plan that is focused on the specific resources and characteristics [redacted]. The plan and data compiled during the implementation of the other mitigation measures will assist [redacted] in determining the most appropriate and feasible actions to help preserve the TCP from foreseeable threats. The plan may also foster collaborative efforts among the municipal, state, and private parties to preserve the unique physical and cultural assets [redacted].

4.3.2 Scope of Work

The scope of work will consist of the following:

- RFPs[4];
- Proposals by qualified consultants in response to the RFP;
- Community charette(s) to select priority resources and/or risks;
- Draft plan for review and comment by participating parties; and
- Final plan.

4.3.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input from the Participating Parties on the criteria for selection and priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.3.4 Standards

The Climate Adaptation Planning Study will be conducted by qualified professionals with Global Association of Risk Professionals' Sustainability and Climate Risk certification and/or demonstrated experience in the preparation of climate change risk assessments for municipal, state, or federal governments.

4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft Plan for review and comment by participating parties; and
- Final Plan.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

[4] [redacted] the RFP for measures described in Sections 4.1 and 4.2 may be combined, provided the scoping is appropriate to encompass the separate deliverable.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA Substitution schedule for Revolution Wind Farm, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).[5]
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[5] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with tribal nations are performed by professionals who have demonstrated professional experience consulting with Native American tribes and descendant communities.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – [redacted] TCP, February 16, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA Substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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[redacted]

Revolution Wind, LLC. 2021. *Construction and Operations Plan for the Revolution Wind Farm and Revolution Wind Export Cable Project.* Available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021. Accessed January 12, 2022.

[redacted]

ATTACHMENT 8 – THE [redacted] TRADITIONAL CULTURAL PROPERTY [redacted] MASSACHUSETTS & ATLANTIC OUTER CONTINENTAL SHELF

[Insert ATTACHMENT 8 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The [redacted] Traditional Cultural Property

[redacted] Massachusetts & Atlantic Outer Continental Shelf

Submitted to:

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The [redacted] Traditional Cultural Property (TCP), [redacted] Massachusetts and Atlantic Outer Continental Shelf
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement

FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
ROD	Record of Decision
RWF	Revolution Wind Farm
TCP	Traditional Cultural Property
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the [redacted] Traditional Cultural Property (the historic property), which was determined eligible for listing in the National Register of Historic Places by the Bureau of Ocean Energy Management in 2021, provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. [redacted] Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) with Federally recognized Native American Tribes and interested consulting parties to review conceptual mitigation measures for the historic property.

Revolution Wind anticipates these parties, and any subsequently identified parties, will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Property included in the HPTP

Name	Municipality	State	Site No. (Agency)	Ownership
The [redacted] TCP	Multiple	MA	N/A	Multiple

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

[redacted]

The maritime setting of the TCP is integral to its historical and cultural significance. [redacted]

3.3 The [redacted] TCP

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The TCP maintains a high degree of integrity despite alterations through time [redacted]

3.3.1 Historic Context

[redacted]

[redacted]

[redacted]

3.3.2 NRHP Criteria and the Maritime Visual Setting

The [redacted] TCP is eligible for listing in the National Register under the following criteria:

- Criterion A [redacted];
- Criterion B [redacted];
- Criterion C [redacted]; and
- Criterion D for its potential to yield information [redacted]

The maritime setting of the TCP is integral to its historical and cultural significance. [redacted]

4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Support

4.1.1 Purpose and Intended Outcome

The mitigation measure would improve virtual interpretative or physical exhibits. The measure would also provide funding to enhance stewardship of critical cultural resources.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Identification of appropriate printed and/or digital media for interpretative exhibits;
- Archival research on the history, development, and historical/cultural significance ;

- Consultation with Participating Parties;
    - Consultation meetings and discussions [redacted] will be bilateral with Revolution Wind unless otherwise requested and agreed upon by the federally-recognized Native American Tribes.
- Design and production of draft interpretive materials;
- Design and production of final printed and/or digital interpretive materials; and
- Scoping of an Improved Access Assessment in direct consultation [redacted]

Final deliverables produced by the consultant will incorporate further comments and any additional information provided by the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a Request for Proposals (RFP) for consultant services in consultation with the Participating Parties and will seek input from the consulting Tribes on the criteria for selection and the Tribes' priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.1.4 Standards

Documentation will be prepared by professionals meeting the qualifications specified in the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61). Scoping for the Improved Access Assessment will include the advice and guidance of individuals with appropriate professional qualifications for unexploded ordnance surveys and clearance activities if the Aquinnah and Mashpee agree that such efforts are appropriate.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
- Final deliverables.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Scholarships and Training [redacted]

4.2.1 Purpose and Intended Outcome

[redacted] Development of the lands and seas within and near the TCP will continue to alter the character-defining elements of the historic property. Climate change is also threatening multiple culturally significant habitats and associated plant and animal communities [redacted] The purpose of this measure is to enhance the capacity [redacted] to preserve the critical physical and cultural attributes of the TCP through training and education [redacted]. Revolution Wind would fund scholarships and fees for professional training or certification programs in the fields of Astronomy, Archaeology/Anthropology, Marine Sciences, Aquaculture, Marine Fisheries, Marine Construction, Native American Studies, Ethnohistory, History, Biology, and related fields through this measure. [redacted] recipients of financial support funded through this measure may be required to perform a limited period of service [redacted] related to their field of study or training.

The intended outcome of this measure is to [redacted] protect and preserve the TCP and its constituent elements through education and professional development. Traditional stewardship activities, [redacted] would be enhanced through incorporation of professional and academic training with traditional knowledge.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Development of selection criteria for qualified applicants to receive financial support for educational and training opportunities;
- Development of specific accreditation requirements for educational and training programs to which qualified tribal members may enroll;
- Establishment of the appropriate [redacted] departments to select among applicants to the funding program;
- Development of fiscal control measures and annual reporting standards for all disbursements; and
- Development of a Scholarship Program Proposal for review by Revolution Wind prior to initial disbursements, with proposed administrative costs to compensate [redacted] for administration of the program.

4.2.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input [redacted] on the criteria for selection and the [redacted] priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.2.4 Standards

Documentation will be prepared by professionals with demonstrated experience in education and training program management and fiscal reporting.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Executed contracts between the implementing party and selected consultants; and
- Draft Scholarship Program Proposal; and
- Final Scholarship Program Proposal.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Coastal Resilience and Habitat Restoration

4.3.1 Purpose and Intended Outcome

Climate change poses a significant threat to [redacted] elements of the TCP. Rising seas and water temperatures, expansion of invasive species, trends towards shorter, warmer winters, and the increased frequency and intensity of coastal storms are expected to result in future losses of character defining features and contributing resources to the historic property. This measure will provide funding for planning and implementation of targeted efforts to mitigate such foreseeable losses, support economically sustainable [redacted] practices, and documentation and/or recover of threatened elements of cultural sites associated with the TCP.

The intended outcome of this measure is to identify, and where appropriate, implement projects to preserve, recover, and enhance culturally sensitive species habitat, cultural sites, and to offset the foreseeable impacts of climate change. The structure of this measure is intended to provide for appropriate flexibility [redacted]

[redacted] to respond to changing conditions over the period of funding and accounts for the unpredictability of certain future environmental conditions. The proposed funding would support phased planning and implementation of related activities. [redacted]

4.3.2 Scope of Work

The scope of work will consist of the following:

- Development of selection criteria for qualified planning and implementation activities;
- Development of specific professional qualifications for support of funded activities;
- Designation of the appropriate [redacted] body to select project proposals for funding; and
- Development of fiscal control measures, including conflict of interest provisions, and annual reporting on all funded activities.

4.3.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input [redacted] on the criteria for selection and the [redacted] priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.3.4 Standards

Documentation will be prepared by professionals with demonstrated experience in archaeology, habitat restoration, coastal resilience planning program management and fiscal reporting, as appropriate to the specific funded activities.

All archaeological surveys or other subsurface terrestrial investigations on any land owned or controlled by the Commonwealth of Massachusetts, its agencies or political subdivisions or on any historical or archeological landmarks or on any lands restricted by Massachusetts General Law (MGL) c. 184, § 31 will be conducted in accordance MHC regulations (950 CMR 70). This HPTP does not require MHC permitting for activities that would not otherwise require such permitting.

4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft deliverables; and
  Final deliverables.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.4 Archaeological and Cultural Sites Data Compilation

4.4.1 Purpose and Intended Outcome

[redacted] The measure would provide for a systematic update of existing Massachusetts Historical Commission (MHC)-maintained resource inventories for sites associated with the affected TCP. A historic context for the TCP, drawing upon a NRHP-nomination prepared by others, would be developed to integrate newly compiled information and enhance [redacted] stewardship efforts.

The intended outcome of this measure is an updated open-source GIS inventory of archaeological/cultural sites that contribute to the significance of the [redacted] TCP and a companion historic context that assists [redacted] in prioritizing preservation and stewardship efforts. Where feasible, the inventory will include updated information on the existing conditions of contributing resources.

4.4.2 Scope of Work

The scope of work will consist of the following:

- Collection and review of existing [redacted] documentation of contributing resources to the [redacted] TCP;
- Coordination with the parties preparing the NRHP nomination for the TCP to verify resource inventory;
- Field visits and photo-documentation, as feasible, to document existing conditions at contributing archaeological and cultural resources within the TCP;
    - Field visits and documentation will be coordinated with the parties preparing the NRHP nomination to avoid duplicative efforts.
- Development of one or more historic contexts for interpretation of contributing resources in alignment with the draft NRHP nomination;
- Preparation and submittal of revised MHC archaeological site forms or comparable documentation for non-archaeological resources to MHC;
- Preparation of GIS data in an open-source format suitable for incorporation in [redacted] existing GIS infrastructure;
- Submittal of draft historic context(s) and inventory forms to Participating Parties for review and comment; and

- Submittal of final work historic context(s) and MHC inventory forms to participating parties.
    - All submittals to MHC will follow agency guidelines regarding document formatting and print size.

4.4.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input [redacted] on the criteria for selection and [redacted] priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.4.4 Standards

The updated inventory will be prepared by professionals meeting the Secretary of the Interior's professional qualification standards in archeology and/or history (36 CFR 60) and in direct consultation [redacted].

4.4.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft and Final Historic Context(s) and MHC Inventory Forms; and
- Open source GIS database will be for sole use [redacted] or sharing with other Participating Parties [redacted]

4.4.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.5 Maritime Cultural Landscapes & Interconnected Contexts

4.5.1 Purpose and Intended Outcome

[redacted] his measure will draw upon on-going [redacted] studies and documentation of the

[redacted] TCPs, interviews with traditional knowledge holders[redacted], and supplemental archival research to document the interconnected components of a broader maritime cultural landscape. [redacted] The intended outcome is a publicly-available and inclusive synthesis of information and knowledge about the maritime cultural landscapes along the shores, coastal islands, and waters of southern New England and Long Island. [redacted]

4.5.2 Scope of Work

The scope of work will consist of the following:

- Collection and review of available documentation regarding [redacted] traditions associated with the coastal and submerged lands and waters of the region;
- Consultations[2] [redacted] to refine the geographic extent of a potential maritime cultural landscape;
- Consultations [redacted] to identify appropriate knowledge-holders with an interest in sharing traditions and beliefs associated with the maritime cultural landscape;
- Consultations with appropriate knowledge-holder to identify appropriate names and terms for significant elements of the cultural landscape;
- Preparation of draft mapping depicting the boundaries and sub-divisions or significant elements of the landscape;
- Interviews with traditional knowledge-holders to collect information regarding traditions and variations on traditions associated with the cultural landscape;
- Creation of GIS data layers depicting the boundaries and names of significant maritime cultural landscape elements;
    - To the extent feasible and practicable, GIS data will be formatted to be compatible with open-source platforms used by the Tribes or employed to share data generated from other offshore wind projects in the region;
- Submittal of a preliminary draft report and mapping synthesizing the information gathered;
- Review of all comments and suggestions provided [redacted] on the preliminary draft report;
- Submittal of a second draft report to Participating Parties for review and comment; and
- Submittal of final report to Participating Parties.

[2] Consultations under this Scope of Work will be conducted [redacted] unless requested and agreed upon [redacted].

4.5.3 Methodology

Revolution Wind will release a RFP for consultant services in consultation with the Participating Parties and will seek input [redacted] on the criteria for selection and [redacted] priorities for the consultant team's qualifications and experience.

Final deliverables produced by Revolution Wind or their consultant team will incorporate further comments and any additional information provided by the Participating Parties.

4.5.4 Standards

The report will be prepared by professionals meeting the Secretary of the Interior's professional qualification standards in cultural anthropology, archeology, and/or history (36 CFR 60) and in direct consultation [redacted].

4.5.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft and Final reports; and
- Open-source GIS database will be for sole use [redacted] or sharing with other Participating Parties [redacted].
- If mutually agreed [redacted], a publicly-available Open-source GIS will be created for access by other Participating Parties and members of the surrounding communities.

4.5.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA Substitution schedule for Revolution Wind Farm, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.
- BOEM may, at its discretion, assist the implementing party in inter-agency coordination with USFWS and the Navy.

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.2 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by federally recognized Native American Tribes and interested consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with Participating Parties. As of July 2022, this outreach has included the following:

- Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – [redacted] TCP, February 9, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA Substitution schedule for Revolution Wind Farm (see Section 5.5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

Bureau of Ocean Energy Management (BOEM), 2021. Supplement to the Finding of Adverse Effect For the Vineyard Wind 1 Project Construction and Operations Plan, March 9, 2021. Available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Supplemental-FoAE.pdf.

Code of Federal Regulations (CFR). 2022. 40 CFR 1500 – National Environmental Policy Act Implementing Regulations. Available at https://www.ecfr.gov/current/title-40/chapter-V/subchapter-A. Accessed January 7, 2022.

CFR. 2021a. 36 CFR 800 – Protection of Historic Properties [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-VIII/part-800. Accessed December 21, 2021.

CFR. 2021b. 36 CFR 61.4(e)(1) – Procedures for State, Tribal, and Local Government Historic Preservation Programs [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-I/part-61#p-61.4(e)(1). Accessed December 21, 2021.

CFR. 2021c. 36 CFR 65.2(c)(2) – National Historic Landmarks Program – Effects of Designation [incorporating amendments effective December 15, 2021]. Available at https://www.ecfr.gov/current/title-36/chapter-I/part-65#p-65.2(c)(2). Accessed December 21, 2021.

Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR). 2022. *Historic Resources Visual Effects Analysis, Revolution Wind Farm.* Syracuse, NY. July 2022.

Federal Register. 1997. 62 FR 33708 – The Secretary of the Interior's Historic Preservation Professional Qualifications Standards. Office of the Federal Register, National Archives and Records Administration. Washington, D.C. Available at https://www.govinfo.gov/app/details/FR-1997-06-20/97-16168. Accessed December 21, 2021.

Federal Register. 2021. FR30068 -Department of the Interior, Bureau of Ocean Energy Management, Docket No.: BOEM-2021-0029. *Notice of Intent to Prepare an Environmental Impact Statement for Revolution Wind LLC's Proposed Wind Energy Facility Offshore Rhode Island; Reopening of Comment Period and Corrections.* Office of the Federal Register, National Archives and Records Administration. Washington, D.C. Available at https://www.govinfo.gov/content/pkg/FR-2021-06-04/pdf/2021-11727.pdf. Accessed February 8, 2022.

Massachusetts General Law (MGL). 2020. Chapter 184, Section 31: Restrictions, Defined [incorporating

Revolution Wind, LLC. 2021. *Construction and Operations Plan for the Revolution Wind Farm and Revolution Wind Export Cable Project.* Available at https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan-april-2021. Accessed January 12, 2022.

[redacted]

[redacted]

[redacted]

United States Code. 2016. Title 54 - National Historic Preservation Act [as amended through December 16, 2016]. Available at https://www.achp.gov/sites/default/files/2018-06/nhpa.pdf. Accessed December 21, 2021.

[redacted]

ATTACHMENT 9 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: SALTER'S POINT, TOWN OF DARTMOUTH, BRISTOL COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 9 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review and Comment by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Salters Point

Town of Dartmouth, Bristol County, Massachusetts

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Salters Point
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for Salters Point, which has been determined by the Massachusetts Historical Commission (MHC) to be eligible for listing on the National Register of Historic Places (NRHP) (the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

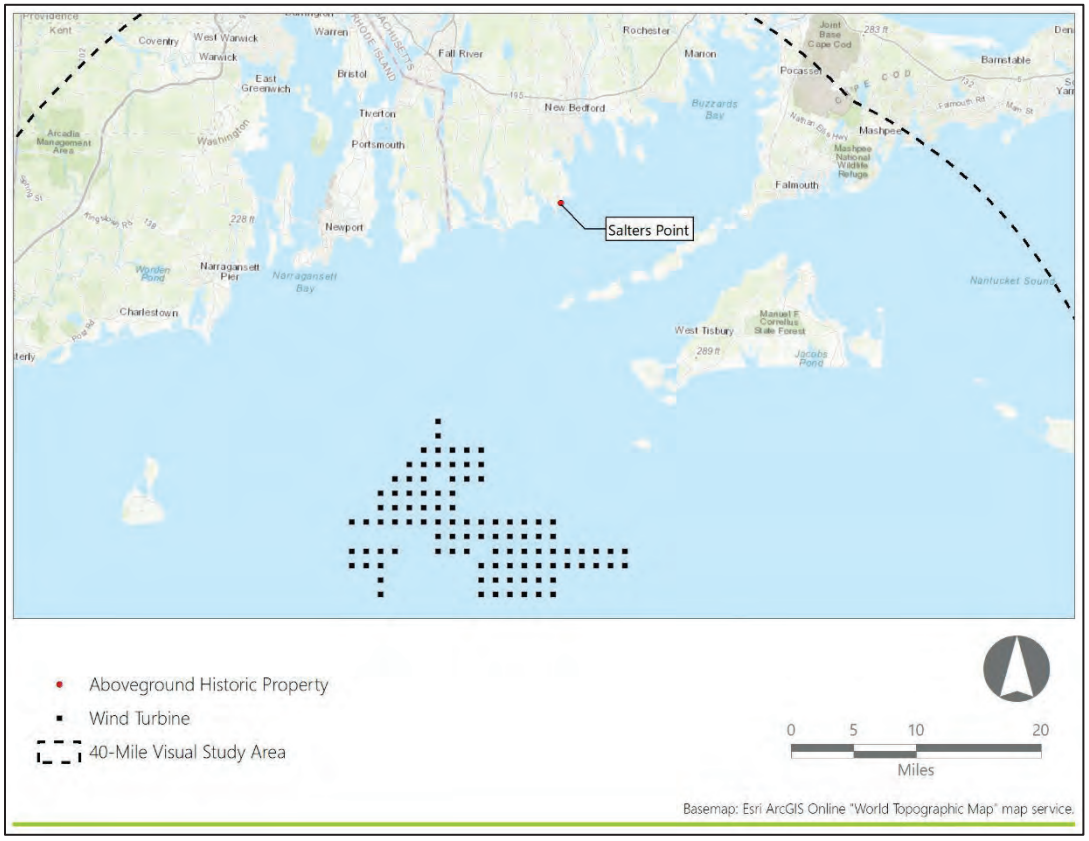
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (Federal Register, 2021). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Dartmouth
- The Massachusetts Historical Commission.[2]

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

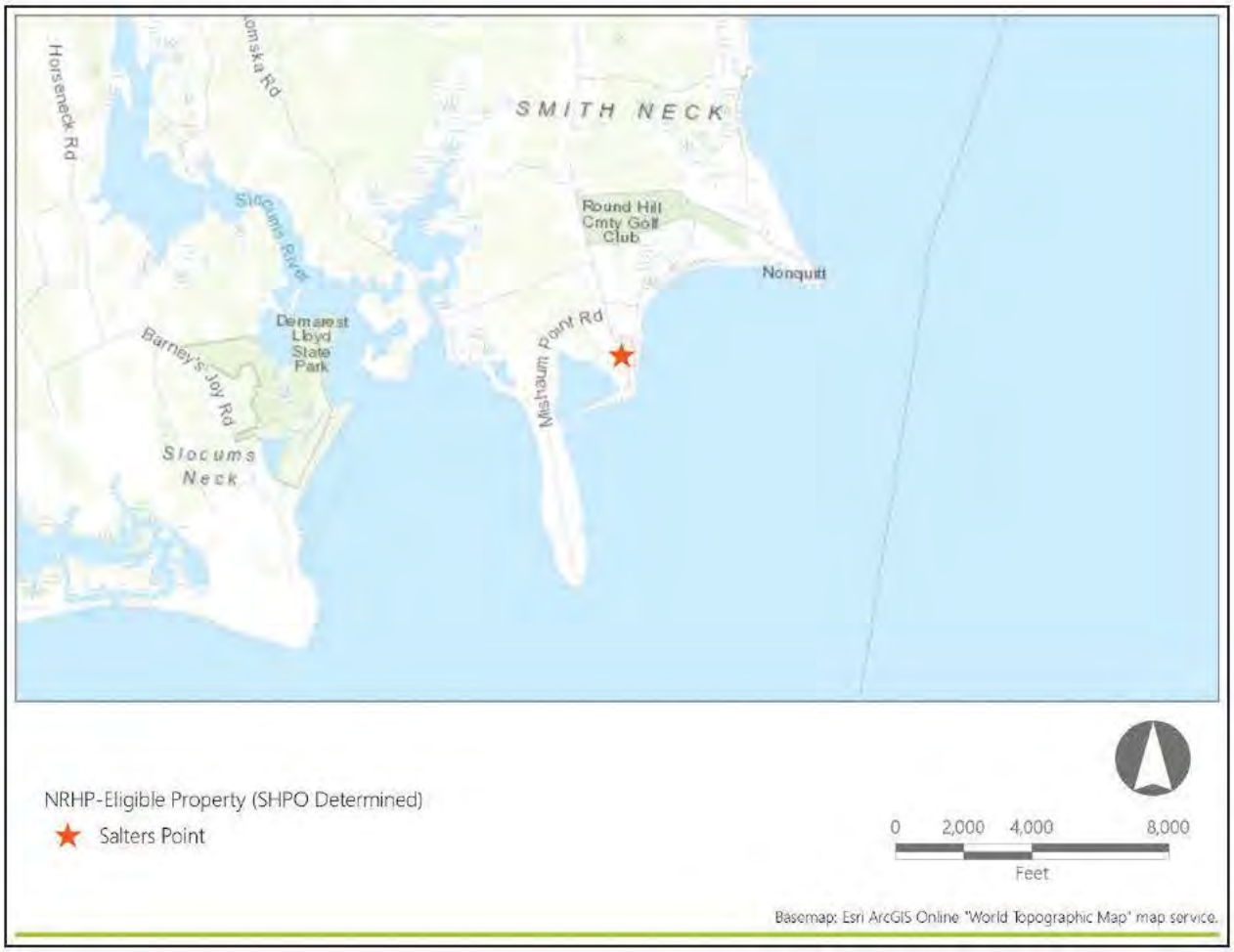
3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Property included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Salters Point	NRHP-Eligible (MHC Determined)	Dartmouth	MA	DAR.B (MHC)	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

Salters Point is considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the Estates and Estate Complexes property type. These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 Salters Point

3.3.1 Physical Description and Existing Conditions

Salters Point is located at the southern end of Smith Neck Road and is physically defined by a stone wall with a sign indicating it is private property at the intersection of Smith Neck and Mishaum Point Roads. Within the boundaries of the district are Buzzard's Bay Avenue, Ocean Avenue, Gosnold Avenue, Barn Way, Riley Street and Naushon Avenue. Salters Point, as it currently stands, was developed as a resort community between c. 1890 and c. 1910.

3.3.2 Historic Context

Historically, Salters Point was a farm known as "Southern most farm" or "Salt House Point Farm" (Weinstein, 1983). Two of the properties associated with Benjamin Smith's Salt House Point Farm remain, 108 and 116

Ocean Avenue. In addition, as Dartmouth had a strong salt industry during the eighteenth century, a salt works was located on Salters Point in the early eighteenth century (MHC, 1981).

In the 1890s, a group from New Bedford, Massachusetts purchased 77 acres on Salters Point to develop a summer resort colony. Roads within the point were developed and lots were defined. According to the MHC Form, the developers established rules that the new owners had to follow, including each lot could have only one structure, "indoor earth closets or privies were required and no liquor could be made or sold on the premises." The majority of residences were constructed in the Colonial Revival style. As a resort, Salters Point had a casino, bowling alley, tennis courts, a yacht club, and a nine-hole golf course (Weinstein, 1983).

The Salters Point Inn was constructed in 1900 and had 20 bedrooms. The farmhouse located at 108 Ocean Avenue was used as an annex to the Inn (Melhuish, 2010). The Inn was a gathering place for the residents of Salters Point, many of whom would eat in the dining room regularly. The Inn was demolished in 1946 (Weinstein, 1983).

Nine properties within the boundaries of Salters Point have individual MHC Inventory Forms: the Smith Family Cemetery, 61 Naushon Avenue, the Benjamin Smith/Giles Smith House, the Alvin F. Waite/James T. Smith House at 116 Ocean Avenue, the Alvin F. Waite/James T. Smith House at 124 Ocean Avenue, the Frederick H. Wilks House, the George Bartlett House, the Lydia A. Payne House, and the Salters Point Water Corporation Building. The buildings were constructed between circa 1680 and circa 1900, with the oldest being part of the original farm and the latest built as part of the Salters Point resort.

3.3.3 NRHP Criteria and the Maritime Visual Setting

Salters Point is significant under Criterion A as a designed summer resort colony on the Massachusetts coastline and Criterion C for its Colonial Revival style architecture. Its role as an eighteenth-century farmstead and salt works are also important aspects of the district's significance.

Salters Point The is sited on the eastern side of the Salters Point peninsula with prominent views of eastern Buzzards Bay and the Elizabeth Islands. The district is visually and historically linked to the maritime environment through recreation and aesthetic considerations that contributed to its development. Although some screening of the ocean horizon in the direction of Rhode Island Sound is provided by Mishaum Point to the southwest, open views towards the southern portions of the Project are expected.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Context for Summer Cottage/Resort Development

4.1.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Dartmouth. These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;

- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.1.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Massachusetts Historic Properties, February 10, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 10 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: 744 SCONTICUT NECK ROAD, TOWN OF FAIRHAVEN, BRISTOL COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 10 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review and Comment by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

744 Sconticut Neck Road

Town of Fairhaven, Bristol County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	744 Sconticut Neck Road
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for 744 Sconticut Neck Road, which has been determined by the Massachusetts Historical Commission (MHC) to be eligible for listing on the National Register of Historic Places (NRHP) (the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
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- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

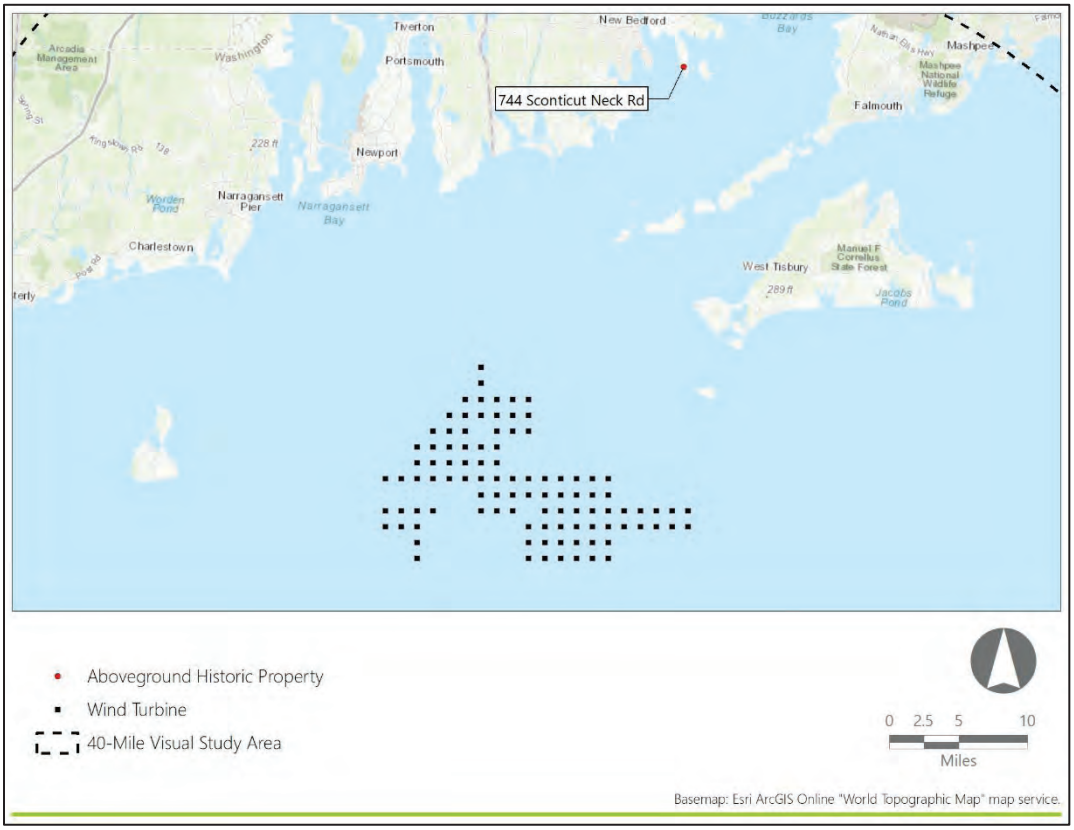
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (Federal Register, 2021). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Fairhaven
- The Massachusetts Historical Commission.[2]

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Property included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
744 Sconticut Neck Road	NRHP-Eligible (MHC Determined)	Fairhaven	MA	FAL.302 (MHC)	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

744 Sconticut Neck Road is considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the Estates and Estate Complexes property type. These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 744 Sconticut Neck Road

3.3.1 Physical Description and Existing Conditions

744 Sconticut Neck Road, also known as 736 Sconticut Neck Road, is located on the west side of Sconticut Road overlooking Buzzards Bay on Sconticut Neck in Fairhaven, Massachusetts. The building is a two-and-a-half story, shingle-clad, stone foundation, four-square colonial revival style residence built circa 1910. A veranda appears to wrap around three sides of the building and three hipped dormers extend from the roof on the eastern, southern and western sides.

Per aerial and topographic map review as well as the Town of Fairhaven Property Records, the property currently has four outbuildings, at least one was constructed circa 1920 (Patriot Properties, 2022). A carriage house/garage is located at the rear of the property can has a hipped dormer, two garage doors, a cupola, and living space. A second carriage house/garage is located behind the house and the main building has a

hipped dormer, two garage doors, a cupola, and living space. A one-story addition is located off the western elevation. Two smaller structures are located to the south of the existing pool.

3.3.2 Historic Context

In the mid-to-late 1870s, resort development began along Sconticut Neck due to the town's location as a suburb of New Bedford (MHC, 1981). Sconticut Neck's location between Buzzards Bay and Nasketucket Bay made this formerly sparsely developed area a prime location for summer homes. A review of available historic and topographic maps indicates that the majority of buildings along Sconticut Neck Road were not constructed until the early twentieth century, and there has been relatively little development over the past century, preserving the predominantly rural character.

3.3.3 NRHP Criteria and the Maritime Visual Setting

The property at 744 Sconticut Neck Road appears to meet NRHP Criteria C as an early-twentieth-century residence and outbuildings associated with the history and development of Sconticut Neck. The house is a largely unmodified, representative example of an early-twentieth-century four-square residence with an intact agricultural and maritime context in the region. 744 Sconticut Neck Road is sited on the west side of Sconticut Neck between Buzzards Bay and Nasketucket Bay on a flat, open plot of land with open views towards the western sections of Buzzards Bay and portions of Rhode Island Sound, beyond.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Context for Summer Cottage/Resort Development

4.1.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Fairhaven. These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;

- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.1.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. The proposed mitigation measures were developed by Revolution Wind. As part of the development of this HPTP, Revolution Wind anticipates conducting targeted outreach with the Participating Parties identified in Section 2.3.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 11 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE FORT TABER HISTORIC DISTRICT AND THE FORT RODMAN HISTORIC DISTRICT, TOWN OF NEW BEDFORD, BRISTOL COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 11 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Fort Taber Historic District

The Fort Rodman Historic District

City of New Bedford, Bristol County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Fort Taber Historic District and the Fort Rodman Historic District
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
RFP	Request for Proposals
ROD	Record of Decision
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Fort Taber Historic District, which is listed on the National Register of Historic Places (NRHP) and the Fort Rodman Historic District, which has been determined by the Massachusetts Historical Commission (MHC) to be eligible for listing on the NRHP (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the Historic Property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

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- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

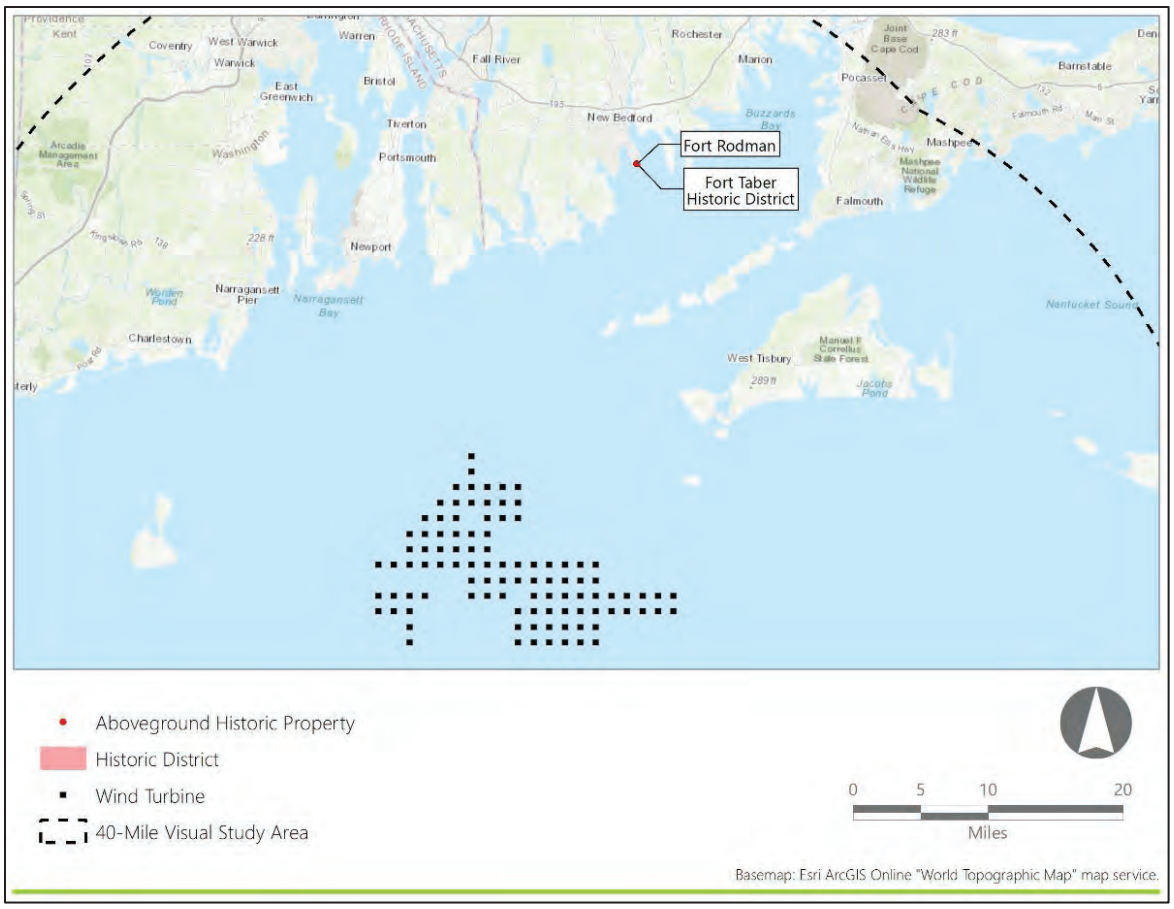
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The City of New Bedford
- The Massachusetts Historical Commission.[2]

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

Revolution Wind anticipates the above-listed party and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves two historic properties, as identified in Table 3.1-1 and located on Figures 3.1-1 and 3.1.2.

Table 3.11-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Fort Taber Historic District	NRHP-Listed	New Bedford	MA	NBE.C	Public (City of New Bedford)	Maritime Safety and Defense Facilities
Fort Rodman Historic District	NRHP-Eligible (MHC Determined)	New Bedford	MA	NBE.F	Public (City of New Bedford)	

Figure 3.1-1. Historic Properties Location



In Sections 3.3. and 3.4, each historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included in the property type defined in the HRVEA as "Maritime Safety and Defense Facilities" within the PAPE consists entirely of facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense. These structures vary in their design and construction materials but are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense.

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of know hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequent located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made.

3.3 The Fort Taber Historic District

3.3.1 Physical Description and Existing Conditions

The Fort Taber Historic District is located in the southern portion of New Bedford, Massachusetts on the banks of Buzzards Bay and encompasses approximately 16.5 acres and consists of six contributing structures and five-gun batteries on a 10-acre site. The main structure, Fort Taber, is a seven-sided masonry fort with an interior martial courtyard. The NRHP-listed District is located at the southernmost point of a peninsula (Clark's Point) and is bound to the south and east by Buzzards Bay, to the west by Clark's Cove, and to the north by Fort Rodman and public properties. The main roads located near the district are Rodney French Boulevard and Brock Avenue, which are located to the north of the district. At the time of its designation,

the Fort Taber District was solely comprised of military structures. Structures included a fort (Fort Taber/Rodman) and five major gun emplacements, or batteries (Butler, 1973).

Much of the surrounding area is comprised of public properties and includes a park and associated parking lot, a beach, a wharf, a wastewater treatment plant, Fort Taber/Rodman, and structures associated with the University of Massachusetts Dartmouth. The topography within the district is very low (5 to 10 feet above mean sea level) as it is situated on a sea-level plain along Buzzards Bay. The landscape is slightly built up and at a higher elevation to the north of the district, within the wastewater treatment plant. Relatively young deciduous trees and pine trees are sparsely scattered throughout the district and surrounding area. Current uses of the district and surrounding area appear to be associated with recreation and public works.

3.3.2 Historic Context

The original fortifications in the Fort Taber District were constructed during the American Revolution and consisted of a series of earthworks mounted with cannons. Despite a British raid in 1778 demonstrating the vulnerability of the port, no improvements or modifications were made until the late 1850s, prior to the Civil War (Fort Taber/Fort Rodman Historical Association, 2021; Butler, 1973). In September 1857, the federal government purchased the Edward Wing Howland farm on Clark's Point for the project. The fort was constructed of granite and designed by Major Richard Delafield, who was assisted in the construction by future Confederate general Robert E. Lee. However, before the granite fort was completed the Civil War began. To provide some defenses, an earthwork fort was constructed to the west of the granite fort. The temporary earthwork fort, named Fort Taber, was completed in 1861 and mounted with brass and iron cannons (Fort Taber/Fort Rodman Historical Association, 2021; Butler, 1973).

By the spring of 1863, the granite-constructed Fort Taber consisted of a seven-sided structure with a five-sided interior courtyard. It was three stories high with five interior rooms. The third story, however, was never completed, with the unused granite blocks being used for the nearby seawall. Four of the interior rooms were utilized for artillery deployment and ammunition storage, while the fifth was utilized as a barracks (Fort Taber/Fort Rodman Historical Association, 2021; Butler, 1973).
Construction of the fort ceased in 1871 following the Civil War, with the fort remaining vacant until 1892, when the City of New Bedford petitioned the War Department for use of the property. The request was granted, and Fort Taber became Marine Park, albeit for a short time. A few years later, in 1898, with the onset of the Spanish American War, the fort was once again utilized by the War Department, rehabilitated, and renamed Fort Rodman in honor of a Massachusetts soldier killed during the Civil War. From 1898 to 1901, during the Endicott Period (1886-1905), five-gun emplacements were constructed to add to the defenses. These guns included Batteries Barton, Craig, Cross, Gaston, and Walcott, all of which are standing today. All five of the gun emplacements were constructed of a reinforced concrete and faced with earth and had steel and iron hardware (Fort Taber/Fort Rodman Historical Association, 2021; Butler, 1973).

Additional improvements were made throughout the first half of the twentieth century, including the construction of an additional gun emplacement (Battery Milliken). However, by 1947 the federal government declared the fort obsolete as a defense installation. While the fort was not used as an active

coastal defensive station, the fort provided an area for Army Reserve training until the end of the Vietnam War. Afterwards, the remains of the original Fort Taber (earthwork fort), its associated batteries, and Fort Taber/Rodman were partially sold to the City of New Bedford for educational and park purposes. During the 1970s, interest in restoration of the fort increased and culminated with the creation of the Fort Taber Society (known as the "Friends of Fort Taber"). Since the 1970s, several improvements occurred to the district and surrounding area including the creation of the Fort Taber Historical Association, Fort Taber Park, and a museum dedicated to Fort Taber's history. Currently, the primary use of the district is as a military museum and park (Fort Taber/Fort Rodman Historical Association, 2021; Butler, 1973).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Fort Taber Historic District was originally listed on the NRHP in 1973 and included Fort Taber/Rodman and the five Endicott Period batteries. According to the NRHP Inventory Nomination Form, the district meets NRHP Criterion C as "representative of American coastal fortifications from the Revolutionary period through the mid-twentieth century. Fort Taber itself is an example of the forts constructed in the northeastern United States during the Civil War and remains in a remarkable state of preservation" (Butler, 1973). The fort was designed by Major Richard Delafield, whose design became the standard for American coastal fortifications from 1861 to 1880. Other architecturally significant components of the fort listed on the NRHP Inventory Form included the "Totten-class" embrasures, believed to be the only example of this class of gunport in the New England region.

The NRHP Inventory Nomination Form also details significant events and people associated with the fort and district, meeting NRHP Criteria A and B. As stated in the previous section, Major Delafield was assisted in the construction of the fort by General Robert E. Lee, who led the Confederate forces during the Civil War. In addition, during the Civil War, New Bedford's "Great Stone Fleet," which assembled at Fort Taber, dealt a severe blow to the Confederacy in 1861 and 1862 with its blockade of the entrances to the Charleston and Savannah Harbors. According to the NRHP Inventory Nomination Form (Butler, 1973), "a planned retaliatory attack by the Confederate *Shenandoah* failed only because the ship could not pass Fort Taber's guns to enter New Bedford Harbor."
The district derives historic significance from its seaside location and maritime visual setting, as the location specifically relied on its coastal setting and maritime view in order to provide defenses.

3.4 The Fort Rodman Historic District

3.4.1 Physical Description and Existing Conditions

The Fort Rodman Historic District is in the southern portion of New Bedford, Massachusetts on the banks of Buzzards Bay and encompasses approximately 47 acres. The district encompasses structures not included within the Fort Taber District, discussed previously. Similarly, thedDistrict is located at the southernmost point of a peninsula (Clark's Point) and is bound to the south and east by Buzzards Bay, to the west by Clark's Cove, and to the north by Fort Rodman and public properties. The main roads located near the historic property are Rodney French Boulevard and Brock Avenue, which are located to the north. At the

time of its designation, the Fort Rodman Historic District consisted of 47 properties, and included military structures associated with Fort Taber/Rodman constructed during the twentieth century (Seasholes, 1989).

Much of the surrounding area is comprised of public properties and includes a park and associated parking lot, a beach, a wharf, a wastewater treatment plant, and structures associated with the University of Massachusetts Dartmouth. The majority of the topography is very low (5-10 feet above mean sea level) as the district is situated on a sea-plain along Buzzards Bay. However, the landscape is slightly built up and at a higher elevation to the north, near the wastewater treatment plant. Relatively young deciduous trees and pine trees are sparsely scattered throughout the surrounding area. Current uses of the surrounding area appear to be associated with recreation and public works.

3.4.2 Historic Context

For the purposes of this historic context, the discussion will focus on the history of Fort Taber/Rodman otherwise not discussed in Section 3.3.2. This includes structures not included within the Fort Taber District (i.e., the Endicott-Taft Period buildings, the World War II buildings, and Battery Milliken).

By the end of the nineteenth century, additional batteries were constructed at Fort Taber/Rodman during the Endicott Period (1886-1905). These included Batteries Barton, Craig, Cross, Gaston, and Walcott, which are included within the Fort Taber District. The installation of these batteries necessitated the construction of housing and other structures for the men who manned the guns. By 1901, construction had begun on a number of new buildings, including officer's quarters, non-commissioned officer's quarters, barracks, an administration building, a fire apparatus building, guardhouse, bake house, storehouses, and a hospital. As of the writing of the Architectural Inventory Form in 1989 (Seasholes, 1989), six of these structures were still standing and included one officer's quarter, a non-commissioned officer's quarter, a bake house, two storehouses, and the fire apparatus building.

In 1906, William Howard Taft, then Secretary of War, headed a coastal defense review board and recommended the installation of additional facilities. These facilities included searchlights, power plants, lighting, and fire control systems. As a result, the construction of an additional battery was completed in 1921 (Milliken). From 1917 to 1918, additional construction spurred by World War I occurred at the fort. Twenty-three new structures were constructed and included barracks, mess halls, a tool house, and one shelter for searchlight detail. None of the buildings from the World War I era survived other than a radio shack (Seasholes, 1989).

Following World War I, Charles L. Gibbs, U. S. Congressman for New Bedford, wrote to the Secretary of War requesting that Fort Taber/Rodman be converted into a public park. However, it was determined that Fort Taber/Rodman would remain a military reservation. While the fort was included on a list of surplus bases in 1926 and a proposal was submitted to demolish the granite fort in 1935, the Secretary of War maintained that the reservation "includes one of the most important seacoast defenses in the First Corps Area" and was needed for occupation by a garrison in case of war. The onset of World War II entered Fort Taber/Rodman into a new phase of its history (Seasholes, 1989).

Troops, housed in temporary wood barracks, arrived at Fort Taber/Rodman in 1940. Construction of the 700 series buildings (the first generation of World War II standardized plans) began in late 1940 and was completed in early 1941. The buildings were located northeast of the fort, in an open area surrounded by the Endicott Period buildings. A new street grid was laid out and buildings were arranged on it in company blocks. Each block at Fort Taber/Rodman consisted of three barracks, one mess hall, one company administration (supply) building, and one company day (recreation) room. A total of five blocks were constructed at the fort. As of the Architectural Inventory Form (Seasholes, 1989), none of the blocks were complete. In addition to the company buildings, the World War II structures at the fort included an officers' quarters, recreation building, post exchange, hospital ward, and other support buildings. Major alterations were also made to Battery Milliken in response to the possibility of air attacks. The updates were completed in 1942 (Seasholes, 1989).

After World War II the base was declared surplus and was deactivated. The guns were removed and salvaged. While the fort was not used for active coastal defense, the facility was utilized as a training center for Army Reserves through the end of the Vietnam War. During the 1960s, additional structures were constructed, with some utilized by the Jobs Corp. In 1973, the City of New Bedford acquired all of Fort Taber/Rodman except for the section that was still the Army base. The World War II buildings were then used by various city-run programs. Today, most of the former military reservation is a public park (Seasholes, 1989; Fort Taber/Fort Rodman Historical Association, 2021).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Fort Rodman District is an NRHP-eligible district and appears to meet NRHP Criteria A and C. At the time the historic property was recorded, it included 47 historic resources. According to the Architectural Inventory Form (Seasholes, 1989:8), the "standing structures at Fort Rodman reflect almost every period of coastal fortifications and Army construction from the Civil War through World War II and are thus an important, if *not* unique, set of buildings." In addition, the historic property is an important part of the "development of American coastal fortifications from the Revolutionary period through the mid-twentieth century," thus contributing to the nearby Fort Taber National Register District.

The Endicott Period buildings were considered well preserved and consisted of an unusual collection of frame buildings built according to standardized Army plans. According to the Architectural Inventory Form (Seasholes, 1989), Battery Milliken, constructed in 1921 and updated during World War II, was one of only nine such batteries in New England and one of only three for 12-inch guns. While the World War II buildings were not quite as intact as the Endicott Period structures, they did comprise the largest number of standing structures within the military reservation and contained several significant architectural components. For example, the World War II era buildings had good examples of the 700 series structures and "World War II Temporary" style structures. In addition, several structures were one of only several surviving examples of their types, such as the post exchange. Because the structures were related to the coastal fortifications built at the time, the buildings were considered contributing to the Fort Taber National Register District.

The district, as a whole, derives historic significance from its seaside location and maritime visual setting, as the location specifically relied on its coastal setting in order to provide defenses.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Implementation of Rehabilitation Plans and/or Universal Access

4.1.1 Purpose and Intended Outcome

The purpose of this HPTP is to provide funding for the next phase of the *2013 Architectural/Structural Assessment & Feasibility Study for Universal Access*, which includes a conditions assessment and recommendations for repairs and rehabilitation of the historic properties (Bargmann et al., 2013). The exact scope of work will be determined in consultation with the Participating Parties according to the priorities outlined in the plan. The intended outcome of this HPTP is to provide funding to ensure the long-term preservation of these two historic properties and to enable all visitors to be able to enjoy the properties.

4.1.2 Scope of Work

The scope of work will be determined in consultation with the Participating Parties based on the priorities outlined in the *2013 Architectural/Structural Assessment & Feasibility Study for Universal Access* and previous work completed. Prior to any work commencing, photographic and written documentation of the existing condition will be recorded and distributed to the Participating Parties. Upon completion of the work, as-built documentation, including photographs will be completed and distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work. Existing conditions will be documented and photographed. Drawings and specifications supporting the scope of work will be developed in compliance with applicable standards (see Section 4.1.4) and distributed to the Participating Parties for review and comment. Final plans and specifications will be developed incorporating any comments from the Participating Parties. The project will require the mobilization of a qualified contractor that is experienced in the repair and rehabilitation of historic properties. As-built documentation, including photographs will be developed and distributed to the Participating Parties upon completion of the project.

4.1.4 Standards

The mitigation measure will comply with following standards:

- Town of New Bedford Historical Commission;
- Town of New Bedford Planning and Zoning; and
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68).

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Photographs and documentation of existing conditions;
- Draft plans and specifications;
- Final plans and specifications; and
- As-built documentation and photography, as applicable.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Massachusetts Historic Properties, February 10, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 12 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: SEVEN HISTORIC PROPERTIES, THE WESTPORT HARBOR HISTORIC DISTRICT, AND THE WESTPORT POINT HISTORIC DISTRICT, TOWN OF WESTPORT, BRISTOL COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 12 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Seven Historic Properties
Town of Westport, Bristol County, Massachusetts

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:



Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:



Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Gooseberry Neck Observation Towers The Gooseneck Causeway The Westport Harbor Historic District The Westport Point Historic District The Westport Point Local Historic District Westport Point Revolutionary War Properties Horseneck Point Lifesaving Station Clam Shack Restaurant
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
ROD	Record of Decision
RWF	Revolution Wind Farm
USACE	United States Army Corps of Engineers
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Gooseberry Neck Observation Towers, which is a Massachusetts Historical Commission (MHC) Historic Inventory Site; the Gooseneck Causeway, which is a MHC Historic Inventory Site; the Westport Harbor Historic District; which is a MHC Historic Inventory Site, the Westport Point Historic District, which has been determined by MHC to be eligible for listing on the National Register of Historic Places (NRHP); Horseneck Point Lifesaving Station, which is a MHC Historic Inventory Site; and Clam Shack Restaurant, which is a MHC Historic Inventory Site, (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and Revolution Wind Farm *Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Significance**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder

engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

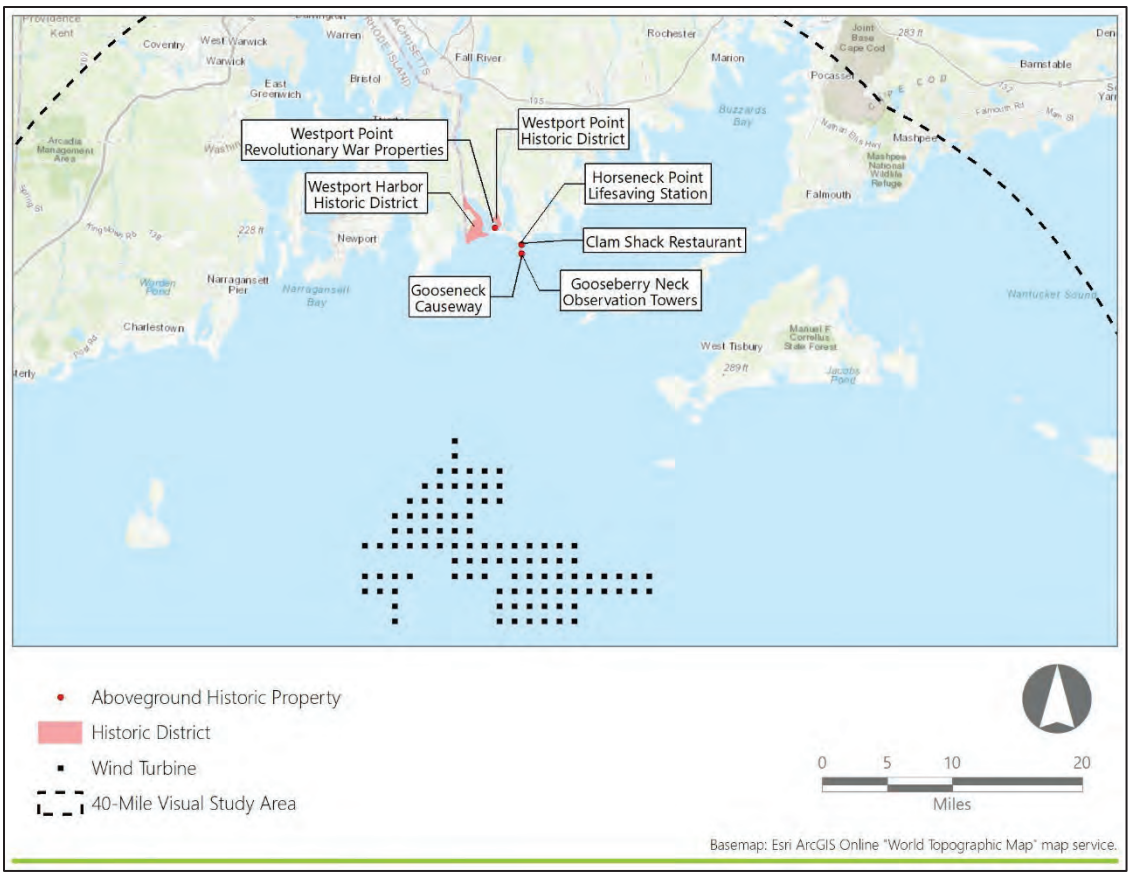
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of Westport
- The Martha's Vineyard Commission
- The Massachusetts Historical Commission.[2]

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

Revolution Wind anticipates the previously listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

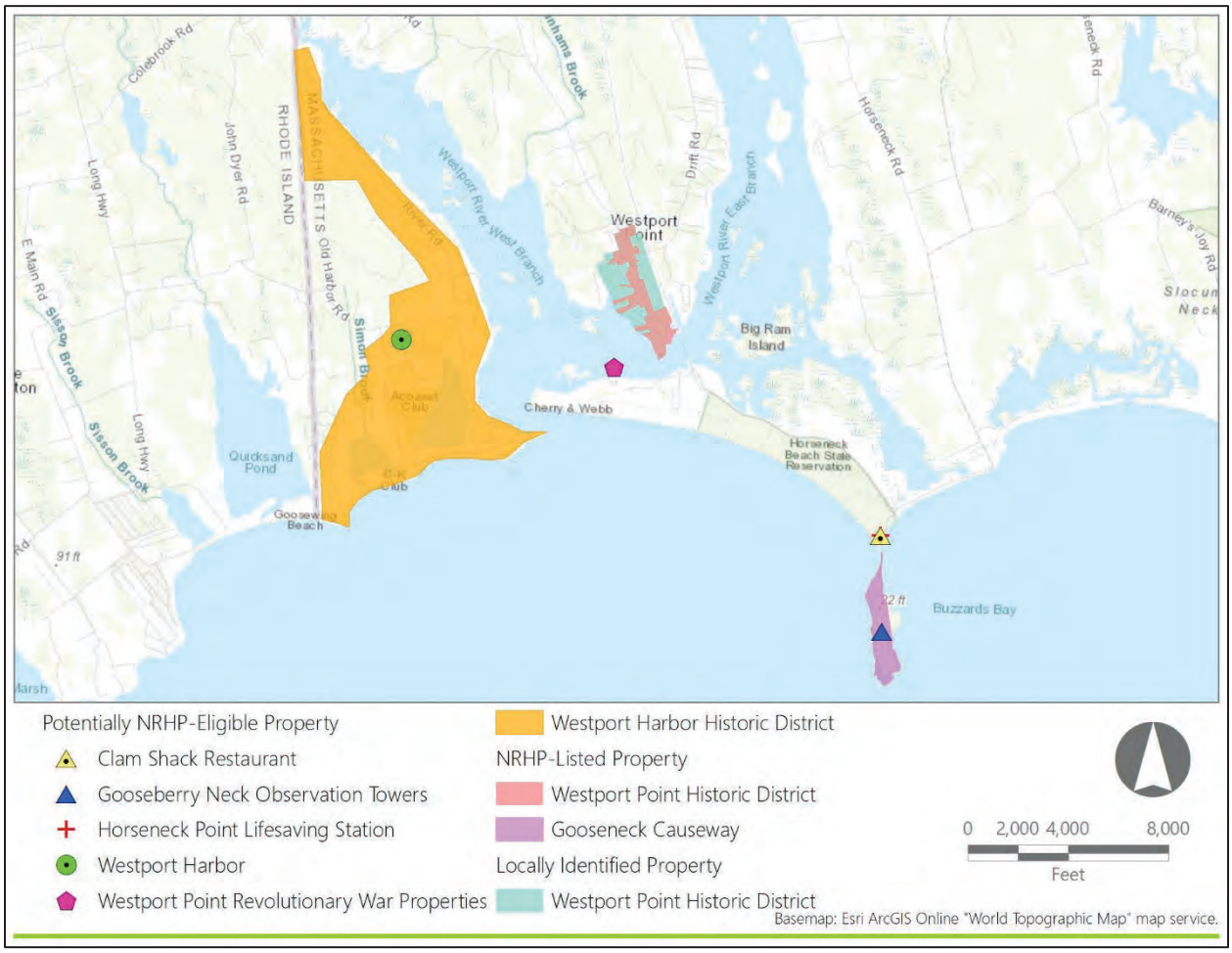
3.1 Historic Properties

This HPTP involves four historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Gooseberry Neck Observation Towers	MHC Historic Inventory Site	Westport	MA	WSP.901 (MHC)	Public	Maritime Safety and Defense Facilities
Gooseneck Causeway	MHC Historic Inventory Site			WSP.902 (MHC)	Public	Historic Buildings and Structures
Westport Harbor Historic District	MHC Historic Inventory Site			WSP.C (MHC)	Private/Public	Historic Buildings and Structures
Westport Point Historic District	NRHP-Eligible (MHC Determined) and Local Historic District			WSP.I (MHC)	Private/Public	Historic Buildings and Structures
Horseneck Point Lifesaving Station	MHC Historic Inventory Site			WSP.732 (MHC)	Public	Maritime Safety and Defense Facilities
Clam Shack Restaurant	MHC Historic Inventory Site			WSP.737 (MHC)	Public	Recreational Properties
Westport Point Revolutionary War Properties	MHC Historic Inventory Site			WSP.M	Private/Public	Historic Battlefields

Figure 3.1-1. Historic Property Locations



In Sections 3.3. through 3.10, each historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Recreational Properties," "Maritime Safety and Defense Facilities," and "Historic Battlefields". Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and Structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these

features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Maritime Safety and Defense Facilities" consists entirely of facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense. These structures vary in their design and construction materials but are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense.

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of know hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequent located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made.

Maritime settings for historic piers, marinas, and related marine infrastructure are likely to include strong associations with specific harbors, coves, and bays where related activities were focused, and which exerted a significant influence on the design and construction of the historic infrastructure. The relationship of such local settings to ocean waters and the extent to which open ocean views represent an important element of a specific historic property's setting will vary depending on the orientation of the shoreline and the location of the historic property. The size and location of historic buildings and structures relative to each other and other elements of the surrounding environment may also be important to the overall integrity of historic maritime infrastructure.

Historic seaside villages, ports and other districts in the study area are commonly characterized by dense development and narrow roadways. The maritime setting for such districts is often obvious and may be expressed through the design and orientation of homes, commercial properties and other buildings, parks, docks, piers, and breakwaters. Depending on the specific characteristics of each district, open ocean views may or may not be available from the majority of historic buildings and other areas within a village. Further, marine viewsheds may encompass limited areas due to the complexity of the shoreline and presence of points, necks, or islands that screen views towards the open ocean. Where ocean versus bay views are available but are tangential to the dominant aspects of maritime viewsheds, changes to those distant ocean views may not diminish the integrity of a seaside village or other historic district. Where ocean views are a dominant aspect of the maritime setting, changes to such viewsheds may diminish the integrity of a historic district, even where views are limited to immediate shoreline sections.

Historic battlefields, such as those associated with significant events of the Revolutionary War or War of 1812, may be associated with maritime settings. Whether this is the case would generally be determined by the extent to which the course of events were associated with observation of waterways or whether important actions occurred in marine contexts. Whether viewsheds associated with maritime contexts for these properties are recognizable and can express their associations is a further consideration in assessing whether changes to ocean views may diminish the integrity of historic battlefields.

"Historic Battlefields" within the PAPE consist of typically large landscapes across which the events of historic military actions took place. Within these battlefield landscapes, any number of more focused and specific points of significance may exist, while the collective significance of the events of the battle is broader.

3.3 The Gooseberry Neck Observation Towers

3.3.1 Physical Description and Existing Conditions

The Gooseberry Neck Observation Towers consist of two reinforced concrete observation platforms sited on Gooseberry Neck, an undeveloped promontory separating Rhode Island Sound and Buzzard's Bay. The towers are located approximately 75 feet apart, and reportedly were intended to appear as a lighthouse complex when viewed from the water at a distance. The northwest tower is roughly two stories tall and square in plan, with an unglazed observation opening at midpoint and an infilled or boarded-up observation opening at an upper level. The southeast tower is taller, with several observation levels and window openings along its height as well as a balcony-like feature below the uppermost level. Most of Gooseberry Neck, including the observation towers, is owned by the Commonwealth of Massachusetts Department of Environmental Management and is open to the public as part of Horseneck Beach State Reservation (DCR Massachusetts, 2012; Wertz and Sanford, 1987a).

3.3.2 Historic Context

The Gooseberry Neck Observation Towers were built by the United States Army Corps of Engineers (USACE) in about 1942 as part of an elaborate network of coastal defenses up and down the East Coast of the United States. At the same time, the USACE rebuilt the Gooseneck Causeway (see Section 3.3). The towers were

used to watch for enemy activity, while additional structures on the site (not extant) disguised auditory detection equipment (Wertz and Sanford, 1987a). A third concrete tower no longer survives. The taller of the two remaining towers now serves as a navigational aid and its location is indicated on the National Oceanic and Atmospheric Administration nautical chart for the region (DCR Massachusetts, 2012).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Gooseberry Neck Observation Towers appear to meet NRHP Criterion A for their role in coastal defense during World War II. The towers' site was strategically selected to offer unobstructed views to Buzzard's Bay, Rhode Island Sound, and the Atlantic Ocean. This maritime setting, along with the open, undeveloped character of Gooseberry Neck, are integral to the towers' historic significance.

3.4 The Gooseneck Causeway

3.4.1 Physical Description and Existing Conditions

The Gooseneck Causeway, also known as the Thomas Edward Pettey Causeway, is an approximately 0.25-mile-long stone and concrete roadway connecting Gooseberry Neck to Horseneck Beach and mainland Massachusetts. The causeway has a long history of construction, loss, and reconstruction due its vulnerability to nor'easters and hurricanes. Prior to construction of the first artificial causeway in 1924, residents and visitors could cross from Horseneck Point to Gooseberry Island on a naturally elevated sand bar. Access was limited to low tide conditions and could be perilous (WHS, 2013). The road surface is comprised of granite blocks and the seawall of the causeway consists of stone riprap. The causeway, along with most of Gooseberry Neck, is owned by the Commonwealth of Massachusetts Department of Environmental Management and is open to the public as part of Horseneck Beach State Reservation. The causeway provides access to Gooseberry Neck, including a public boat launch and a gravel parking lot (DCR Massachusetts, 2012; Wertz and Sanford, 1987b).

3.4.2 Historic Context

Gooseberry Neck was used to graze livestock from at least the early-eighteenth century, when animals were herded at low tide along the sandbar which connected the neck to the mainland. In the early-twentieth century, an attempt was made to subdivide Gooseberry Neck into residential lots for a summer colony (Wertz and Sanford, 1987b). The sandbar was developed into a causeway beginning in approximately 1913, with further improvements in about 1923. The hurricane of 1938 destroyed nearly every structure that stood along the coast in the vicinity of Gooseberry Neck. In about 1942, the causeway was rebuilt by the USACE to provide access for larger vehicles to the coastal defense installation on Gooseberry Neck (see Section 3.2). It was once again repaired in 1969 and 1974 (DCR Massachusetts, 2012; Wentz and Sandford, 1987b).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Gooseneck Causeway appears to meet NRHP Criterion A for its association with the development of seaside recreation in coastal Massachusetts and for its role in coastal defense during World War II. The

property has unobstructed views to Buzzards Bay, Rhode Island Sound, and the Atlantic Ocean. This maritime setting is inextricably linked with the Gooseneck Causeway's historic use and significance.

3.5 The Westport Harbor Historic District

3.5.1 Physical Description and Existing Conditions

The Westport Harbor Historic District is a roughly 1,300-acre district encompassing the historic village center of Acoaxet, Richmond Pond, Cockeast Pond, and outlying rural residences along the West Branch of the Westport River. The district contains numerous nineteenth- and early-twentieth-century residences representing popular period styles, an Eastlake-style chapel, and several private clubs, as well as many miles of stone walls. A handful of eighteenth-century farm residences survive, along with several eighteenth-century cemeteries. Land use within the district is almost exclusively residential, although aerial imagery indicates some limited ongoing agricultural activity. Newer buildings are generally in keeping with existing development patterns, which include the use of deep setbacks, the use of forms and materials common to vernacular coastal building traditions, and the retention of existing stone walls. The district, therefore, conveys the feeling of a secluded vacation community (Wertz, 1987).

3.5.2 Historic Context

The area comprising the Westport Harbor Historic District was primarily agricultural in character well into the twentieth century. In the last decades of the nineteenth century, several summer colonies began to take shape within the Town of Westport, with the largest, known as Acoaxet, developing along the shoreline of Rhode Island Sound near Cockeast Pond. The colony attracted factory owners and professionals from Fall River to the north, and grew to include casinos, bathhouses, and hotels in addition to large private "cottages." Acoaxet continued to develop throughout the twentieth century but suffered widespread damage in the hurricane of 1938 (Wertz, 1987; WHS, 2013).

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Westport Harbor Historic District appears to meet NRHP Criteria A and C for its relationship to the development of seaside resort communities in coastal Massachusetts, and as a collection of representative eighteenth century farmsteads and popular nineteenth and early-twentieth century domestic architecture. Many of the contributing properties within the historic district enjoy expansive views of Rhode Island Sound, Buzzards Bay, and the Atlantic Ocean and were sited to take advantage of those views.

3.6 The Westport Point Historic District

3.6.1 Physical Description and Existing Conditions

The NRHP-Listed Westport Point Historic District is an approximately 86-acre district consisting of 233 contributing buildings, structures, objects, and sites located along Main Road, Valentine Lane, and Cape Bial Lane and comprising the historic core of the coastal village of Westport Point. Within the district, Main Road forms the primary north-south transportation route and terminates at the southern tip of Westport Point at a small cluster of commercial buildings adjacent to a marina. Main Road is densely built with eighteenth-

and nineteenth-century residences with uniformly shallow setbacks along much of its length, conveying the feeling of an early-nineteenth-century port village (Wertz et. al., 1992).

The early history of the district is strongly associated with maritime commerce. The first town landing and ferry were operational in the early eighteenth century, shortly following the establishment of permanent English settlements on Westport Point (WHS, 2013). Cod was an initial focus of commercial fishing, with vessels from Westport Harbor primarily plying the waters off Nantucket and Newfoundland in the early eighteenth century (WHS, 2013). Yankee privateers operated from the relative seclusion of local harbors during the Revolutionary War. Expansion of whaling in the region started in the early nineteenth century and was associated the development of the local docks, wharves, and at least one shipyard within the district. Few of the extant houses in the district are related to the century-long whaling economy, but several of the existing stone wharves were likely constructed to serve the local whaling fleet (Wertz, 1992). The enduring maritime heritage of the district is primarily expressed by the historic docks and wharves and wharfhouses along Westport Point at the southern end of Main Road (Wertz, 1992). Fishing remains a significant economic activity in Westport and the Westport Point Historic District, in particular. Most of the buildings within the district are single-story to two-story wood-frame gable-roofed residences representing vernacular interpretations of architectural styles from the late-eighteenth century through the early-twentieth century. The historic homes of the district largely reflect a late nineteenth-century shift towards summer residences.

3.6.2 Historic Context

Westport Point is one of several villages which developed in the Town of Westport in the eighteenth century. By 1790, there were an estimated one dozen houses at the tip of the point. The village's protected harbor made in an attractive location for shipbuilding, fishing, whaling, and trading activities. The Point was initially owned by a small number of private parties, and maritime commerce was supported by docks and wharves along Horseneck (WHS, 2013). By 1770, pressure for improved facilities led to the subdivision of properties along the south end of Main Road and construction of both private and town-owned wharves. Buildings in the southern portion of the historic district were residences associated with the early maritime community, while land use in the northern part of the district was agricultural. The community experienced an economic decline with the abandonment of whaling in the late nineteenth century; however, the growth of seaside recreation in New England led to the construction of summer cottages at Westport Point from the 1870s onward. Summer residents also purchased and adapted existing buildings. At the turn of the twentieth century, educators, artists, and musicians comprised a large proportion of the summer colony. Among the most significant changes to the district after World War II were the demolition of a circa-1894 draw bridge spanning the East Branch of the Westport River in 1963 (DeVeuve, 2003) and the subsequent construction State Route 88 to the east of Main Road. The new highway and bridge allowed through traffic to the newly created Horseneck Beach State Park to bypass the historic waterfront village (Wertz, 1992). The Westport Point Historic District was listed in the NRHP in 1992 (Wertz, 1992). In 2006, a local Westport Point Historic District was designated, with a larger boundary than the NRHP district.

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Westport Point Historic District meets NRHP Criteria A and C for its association with the Town of Westport's maritime development, as an intact port village with buildings representing vernacular interpretations of eighteenth- and nineteenth-century styles, and as a collection of summer cottage architecture representing styles of the late-nineteenth and early-twentieth centuries. The history of the district is intimately associated with maritime commerce and activities and is reflected in its character as a New England seaside village. Maritime views from the southern portion of the district include waters of the East and West Branches of the Westport River and Westport Harbor. Elevated locations supported by granite outcrops have views that extend southward to Rhode Island Sound and the proposed wind farm. Properties at the northern end of the district enjoy views beyond Horseneck Point to the Elizabeth Islands, Martha's Vineyard, and the Atlantic Ocean (Wertz et. Al., 1992).

3.7 The Westport Point Local Historic District

3.7.1 Physical Description and Existing Conditions

There are 148 resources that contribute to the Westport Point Local Historic District. The district is located on either side of Main Road, roughly bounded by Charles Street to the north, Main Highway to the east, Hulda Cove and Westport Cove to the west and the East Branch Westport River to the south (Westport Historical Commission, 2022).

3.7.2 Historic Context

The development history of the Town of Westport is similar to other towns in coastal New England. From the beginning of its history, the majority of the town was agricultural in nature, including Westport Point. The first farm was established in 1700 by Christopher Gifford. In 1729 a public landing was developed on Westport Point and a ferry service was run to Horseneck Beach. By 1770 the Gifford house was the only house on the point and additional wharves were established for the increasing whaling industry (Westport Historical Commission, 2017).

By 1800, fifteen houses were located on Westport Point, as well as wharves, shops, a windmill, a blacksmith shop, a distillery, and other businesses. From the 1820s to the 1840s, additional buildings were constructed including larger homes and a post office. As in many of the coastal New England towns, in the late nineteenth century, development of summer cottages began on Westport Point (Westport Historical Commission, 2017).

3.7.3 NRHP Criteria and the Maritime Visual Setting

As with the NRHP-listed district, the Westport Point Local Historic District meets NRHP Criteria A and C for its association with the Town of Westport's maritime development, as an intact port village with buildings representing vernacular interpretations of eighteenth- and nineteenth-century styles, and as a collection of summer cottage architecture representing styles of the late-nineteenth and early-twentieth centuries. The history of the district is intimately associated with maritime commerce and activities and is reflected in its

character as a New England seaside village. Maritime views from the southern portion of the district include waters of the East and West Branches of the Westport River and Westport Harbor. Elevated locations supported by granite outcrops have views that extend southward to Rhode Island Sound and the proposed wind farm. Properties at the northern end of the district enjoy views beyond Horseneck Point to the Elizabeth Islands, Martha's Vineyard, and the Atlantic Ocean (Wertz et. al., 1992).

3.8 The Westport Point Revolutionary War Properties

3.8.1 Physical Description and Existing Conditions

The Westport Point Revolutionary War Properties district extends from the southern end of Westport Point, across Westport Harbor (including Whites Flat and Cory's Island), to the western end of Horseneck Point. As stated above, Westport Point was a seaport village and developed into a summer colony in the mid-to-late nineteenth century.

3.8.2 Historic Context

Westport Harbor and Westport Point was a privateering center during the Revolutionary War. During the Revolutionary War, sailors who previously worked on whaling, merchant, and fishing vessels became privateers. For the most part, the privateer's vessels were built outside of Westport. The natural protection of Westport Harbor as well as the narrow channels, islands, and sandbars, made it difficult for large British ships to navigate the harbor; however, the smaller privateer vessels could easily maneuver and remain hidden. The British attacked Westport from the water and did not make landfall (Ford, 2001).

3.8.3 NRHP Criteria and the Maritime Visual Setting

The Westport Point Revolutionary War Properties district is significant under Criterion A for the role the area played in protecting the Massachusetts coastline from the British during the Revolutionary War. It's significance is directly tied to its maritime setting and its location on Westport Harbor. The properties on Westport Point have views beyond Horseneck Point to the Elizabeth Islands, Martha's Vineyard, and the Atlantic Ocean and Horseneck Point has unobstructed views of the ocean (Wertz et. al., 1992).

3.9 The Horseneck Point Lifesaving Station

3.9.1 Physical Description and Existing Conditions

The Horseneck Point Lifesaving Station Is located at 241 East Beach Road at the intersections of East and West Beach Roads and Gooseberry Causeway. The building is a 32-foot by 16-foot, wood frame, post and beam building constructed in 1888 as the 69th lifesaving station constructed by the Massachusetts Humane Society. Barn-style swinging doors are located on the main, eastern, façade and one central window on each of the northern and southern elevations and a vented cupola is located in the center of the roof. The building has been relocated from its original location at the entrance to Westport Harbor at the western end of Horseneck Beach (Flair and Gillespie, 2011).

3.9.2 Historic Context

The Horseneck Point Lifesaving Station was one of the last lifesaving stations built by the Massachusetts Human Society. Its location at the entrance to the harbor was chosen as it was a dangerous location to launch a boat due to the water's current and existing jetty. In 1898 the building was moved to its current location and was discontinued in 1913. In the 1920s, the building was used as a restaurant and a porch and dormers were added. The restaurant closed in 1966 and was eventually used as a residence and then purchased by the State of Massachusetts and is currently a museum (Flair and Gillespie, 2011).

3.9.3 NRHP Criteria and the Maritime Visual Setting

The Horseneck Point Lifesaving Station is eligible for listing on the NRHP under Criterion A as an extant example of a lifesaving station constructed by the Massachusetts Humane Society. Although the building had been altered in the past, it has been restored to its original design.

As a former lifesaving station, the building intrinsically has a strong maritime setting, both in its original and current location. Lifesaving stations were constructed to be able to help sailors along treacherous coastlines. Lifesaving stations were manned and had lifeboats and other safety equipment. The building is located on Horseneck Point with views of the Atlantic Ocean to the west, south and east.

3.10 The Clam Shack

3.10.1 Physical Description and Existing Conditions

The Clam Shack Restaurant is located at 241 East Bach Road on the same parcel as the Horseneck Point Lifesaving Station described above. The building was constructed in 1940 and is a triangular-shaped building built by Ali Alberdeen to be used as a clam shack restaurant. The roof is an almost sweeping, pagoda-like Shape. A door is located centrally on the southeaster elevation with double one-over-one windows on either side. The main entrance is located on the southern façade which is little more than double doors. Two windows are located on the western elevation and a door is centered on the northern elevation. Originally, a take-out window was in the current location of the two doors on the southern façade (Falir, 2011).

3.10.2 Historic Context

Beginning in the mid-to-late nineteenth century and continuing to today, Westport has been a popular destination for summer vacations. Seafood stands and clam shacks were opened throughout New England coastal towns in the early twentieth century. The Clam Shack Restaurant's location on Horseneck Point at the intersections of East and West Beach Roads and Gooseberry Causeway on East Horseneck Beach is an ideal location for a clam shack. In 1966 the restaurant closed was eventually used as a residence and then purchased by the State of Massachusetts and is currently the visitors center for the Westport Fisherman's Association (Flair, 2011).

3.10.3 NRHP Criteria and the Maritime Visual Setting

The Clam Shack Restaurant is eligible for listing on the NRHP under Criterion A as an extant example of an early clam shack restaurant as well as Criterion C for its unique architectural design and shape.

The building has a strong maritime setting and is located on Horseneck Point with views of the Atlantic Ocean to the west, south and east.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Maritime Infrastructure Survey

4.1.1 Purpose and Intended Outcome

The *Town of Westport 2016 Master Plan* identifies the desire for residents, school-aged children, and visitors to have a greater understanding of the town's significant historic and cultural resources (Town of Westport, 2016). The purpose of this mitigation measure is to provide funding to survey and document maritime heritage resources including historic wharves, docks, buildings, and other infrastructure associated with the historic properties identified in this HPTP. The survey will include a focused historic context for the interpretation and evaluation of resources contributing to each district's significance in historic maritime defense, fishing, whaling, and related industries. The updated documentation will enhance local and state efforts to preserve elements of the historic districts that are associated with over three centuries of maritime activity and the distinct character of the local villages and communities.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review of existing archival sources related to historic maritime infrastructure, including interviews with local researchers and other knowledgeable parties, as applicable;
- Photography and mapping of existing conditions;
- Consultation with Participating Parties;
- Preparation of updated MHC inventory forms for individual properties or districts to be distributed to the Participating Parties for review and comment; and
- Drafting of final survey report which will incorporate any comments received and be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant selected will prepare draft MHC Inventory Forms in consultation with the Participating Parties. The forms will be distributed to the Participating Parties

for review and comment and a final survey will be developed incorporating any comments received. The final survey will be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with the following standards:

- The *Secretary of the Interior's Guidance on the Identification of Historic Properties* (36 CFR 800.4);
- The *Secretary of the Interior's Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture* (62 FR 33708);
- Massachusetts Historical Commission guidance;
- The Town of Westport's Community Preservation Commission's guidance, as applicable; and
- The Town of Westport's Cultural Council's guidance, as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft deliverables, including photographs and maps; and
- Final deliverables.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Adaptive Use Guidance

4.2.1 Purpose and Intended Outcome

Information developed from the Historic Maritime Infrastructure Survey will provide a basis for creating appropriate guidance on the preservation and adaptive use of historic wharves, docks, and buildings within the Westport Harbor and Westport Point historic districts. Such guidance may include methods to retain historic materials, finishes, and design elements while sympathetically modifying elements of superstructures or building interiors to accommodate changing commercial needs. Maritime industries are an important element of Westport's history, economy, and culture. Maintaining the integrity of the town's historic assets while supporting economically sustainable marine commerce aligns with the town's objective to:

> *Support fishing infrastructure such as preservation of historic piers, docks, water access and landings, as well as policies that could promote small boat building and repair, and inputs into the marine and fishing industry* (Town of Westport. 2016).

The intended outcome of this mitigation measure is to provide context-appropriate guidance on methods to preserve Westport's historic maritime infrastructure and appropriately adapt it to the current and future needs of the resident communities. Maintenance of commercial fishing and associated commerce is an effective means of retaining the local traditions and knowledge that contribute to Westport Harbor's and Westport Points unique characters and both residents' and visitors' sense of place.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Outreach to the Participating Parties, property-owners, planners, and representatives of the local commercial fishing community to identify current maritime infrastructure needs and preservation opportunities;
- Development of specific guidelines for adapting the extant historic wharves, docks, and other infrastructure to current needs in a manner that retains historic materials, design, and character;
- Distributing the draft guidelines to the Participating Parties for review and comment; and
- The development of final report, incorporating any comments received, to be distributed to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release an RFP for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.2.2. The consultant selected will consult with the Participating Parties to prepare draft guidelines. The guidelines will be distributed to the Participating Parties for review and comment and final guidelines will be developed incorporating any comments received. The final guidelines will be distributed to the Participating Parties

4.2.4 Standards

The project will comply with the following standards:

- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The Secretary of the Interior's *Guidelines for Architectural and Engineering Documentation* (NPS, 2003);
- The Town of Westport's Building Department guidance and regulations, as applicable;
- The Town of Westport's Community Preservation Commission's guidance, as applicable; and
- The Town of Westport's Cultural Council's guidance, as applicable.

4.2.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft deliverables, including photographs and maps; and
- Final deliverables.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Massachusetts Historic Properties, February 10, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 13 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM, NINE HISTORIC PROPERTIES SUBJECT TO ADVERSE EFFECTS IN THE TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 13 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Nine Historic Properties

Town of Aquinnah, Dukes County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	71 Moshup Trail The Leonard Vanderhoop House The Edwin DeVries Vanderhoop Homestead The Tom Cooper House The Theodore Haskins House 3 Windy Hill Drive The Gay Head-Aquinnah Town Center Historic District The Gay Head-Aquinnah Shops The Gay Head-Aquinnah Coast Guard Station Barracks
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
PAPE	Preliminary Area of Potential Effects
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
TCP	Traditional Cultural Property
WTG	Wind turbine generator

1.0 EXECUTIVE SUMMARY

This draft, applicant-proposed Historic Property Treatment Plan (HPTP) for 71 Moshup Trail, which is a Massachusetts Historical Commission (MHC) Inventory Site; the Leonard Vanderhoop House, which is a MHC Inventory Site; the Edwin DeVries Vanderhoop Homestead, which is listed on the National Register of Historic Places (NRHP); the Tom Cooper House, which is an MHC Inventory Site; the Theodore Haskins House, which is an MHC Inventory Site; 3 Windy Hill Drive, which is an MHC Inventory Site; the Gay Head – Aquinnah Town Center Historic District, which is listed on the NRHP; the Gay Head – Aquinnah Shops, which is an MHC Inventory Site; and the Gay Head-Aquinnah Coast Guard Station Barracks, which is an MHC Inventory Site (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA). The final HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by

and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

[1] The timeline is subject to change and is based on current available information.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

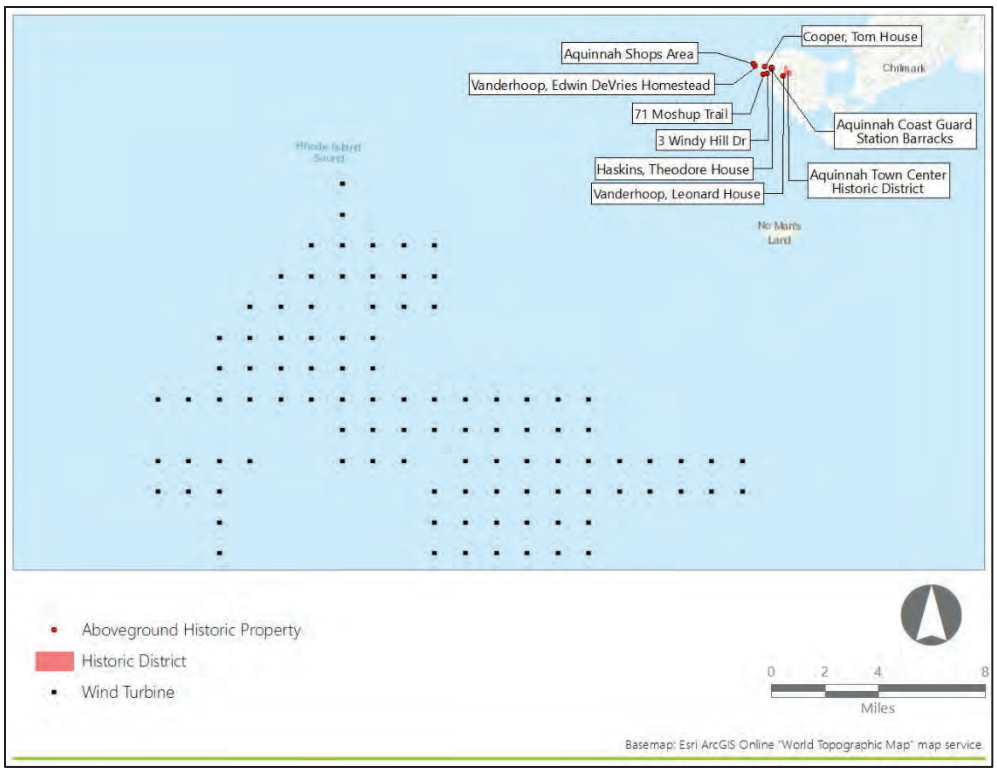
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of a ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. Any mitigation work associated with the historic properties will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation. The MHC holds a preservation easement on the Aquinnah Public Library/Gay Head School (a contributing building to the Gay Head – Aquinnah Town Center Historic District) per Massachusetts General Law Chapter 184, Sections 31-33.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Wampanoag Tribe of Gay-Head (Aquinnah)
- The Martha's Vineyard Commission
- The Gay Head Lighthouse Advisory Committee
- The Town of Aquinnah
- The Massachusetts Historical Commission.[2]

Revolution Wind anticipates these parties, and any subsequently identified parties, will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

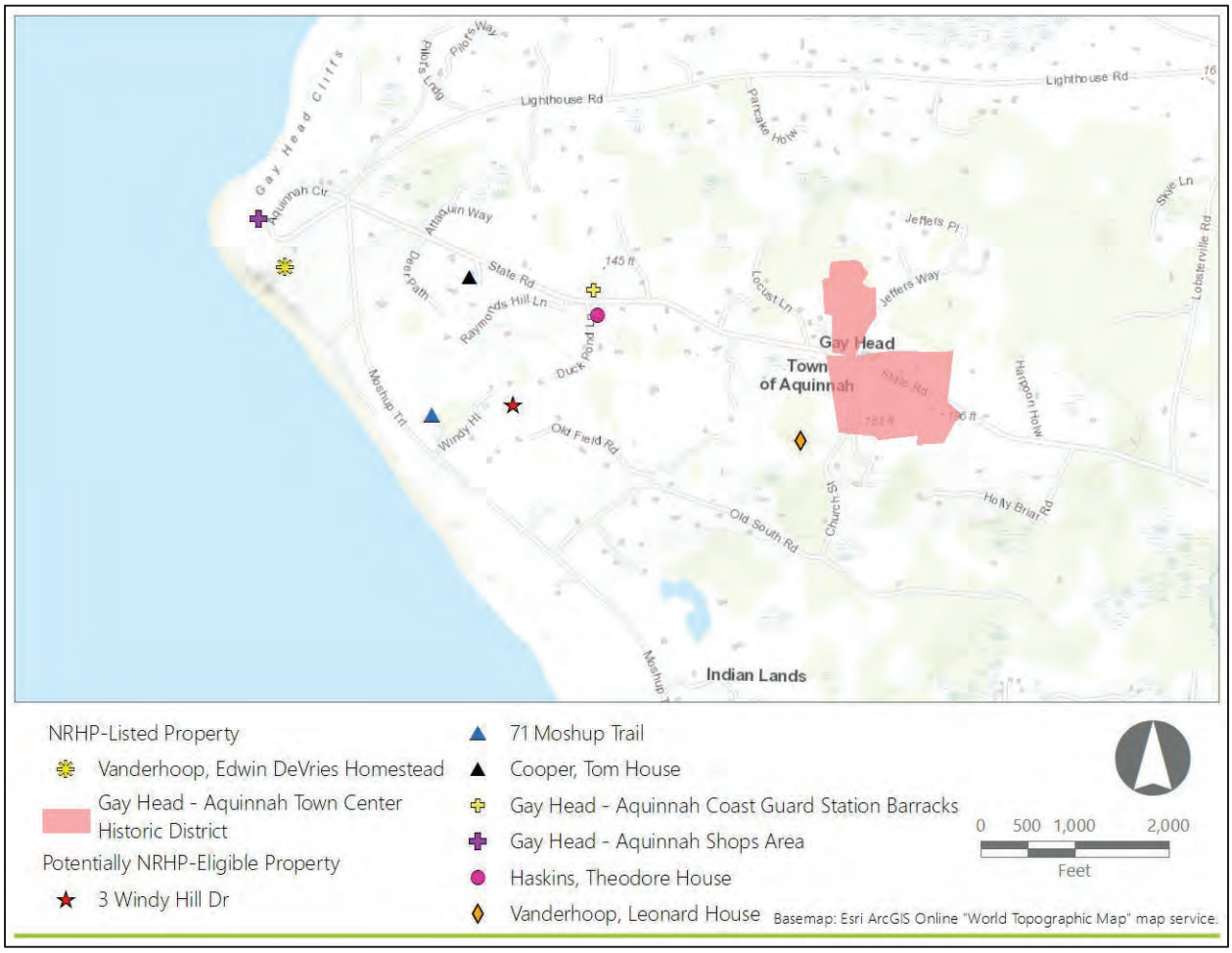
This HPTP addresses eight historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
71 Moshup Trail	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.31 (MHC)	Private	Historic Buildings and Structures
Leonard Vanderhoop House	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.4 (MHC)	Private	Historic Buildings and Structures
Edwin DeVries Vanderhoop Homestead	NRHP-Listed	Town of Aquinnah	MA	GAY.40 (MHC); 06000784 (NPS)	Municipal	Historic Buildings and Structures
Tom Cooper House	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.53 (MHC)	Private	Historic Buildings and Structures
Theodore Haskins House	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.51 (MHC)	Private	Historic Buildings and Structures
3 Windy Hill Drive	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.55 (MHC)	Private	Historic Buildings and Structures
Gay Head – Aquinnah Town Center Historic District	NRHP-Listed	Town of Aquinnah	MA	GAY.A (MHC); 99000187 (NPS)	Municipal; Private	Historic Buildings and Structures
Gay Head – Aquinnah Shops	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.B (MHC)	Private; Tribal Nation	Historic Buildings and Structures

Gay Head-Aquinnah Coast Guard Station Barracks	MHC Historic Inventory Site	Town of Aquinnah	MA	GAY.52	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Sections 3.3. through 3.10, each property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this document.

The historic properties included in this HPTP are all considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures" which includes buildings and associated properties historically used as residences. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting. Historic commercial fishing activities were focused along the eastern shores of Menemsha Pond, which afforded relatively sheltered harbor and access to Vineyard Sound to the north.

Topography and landcover also play critical roles in defining both the historic settings and existing visual settings for each historic property. Of these two factors, the latter has been generally subject to greater change since the period of original construction and/or period of significance for many historic properties located in the Town of Aquinnah. Mid- to late-twentieth century reforestation has transformed many of the formerly open, agrarian lands of Martha's Vineyard and constrained local viewsheds from numerous buildings once set on or near agricultural or pasture lands (e.g. Seccombe, 2010). The extensive agricultural heritage in the area is now largely expressed by the stone walls constructed along former pastures, fields, and roads and the surviving farmhouses and barns. Post-1950 residential construction has affected the settings for a smaller number of historic properties but may have diminished the integrity of historic settings for specific properties. The extensive forest cover affords privacy in many residential areas, but limits direct ocean views.

The topography of Aquinnah is strongly influenced by the last glaciation. The elevated Gay Head (Aquinnah) Cliffs along the western shoreline and the highlands in the central section of the town were formed by deformation and upthrusting of ancient sediments as the ice advanced over the area approximately 24,000 years ago (Oldale and O'Hara, 1984). Where vegetation is absent or sparse, views towards the Project may be available from these higher elevations. The bordering areas along the Menemsha Pond to the east and along the southwestern shores have relatively low relief. Direct views of the ocean horizon are screened from Menemsha Pond by the Gay Head (Aquinnah) Cliffs. In the shoreline areas along the southwestern shores, even the commonly low tree and shrub canopies of the island may screen ground-level views of ocean due to the limited relief.

3.3 71 Moshup Trail

3.3.1 Physical Description and Existing Conditions

71 Moshup Trail is a one-and-one-half-story vernacular residence with a gable roof and wood shingle siding. Notable features include the semi-hexagonal tower and full-width porch on the primary (northeast elevation). Windows are generally two-over-two wood sash, and the primary entry door is offset on the northeast elevation. A single-story shed-roofed addition and a gabled dormer window are located on the

southwest elevation. The building has an asphalt shingle roof and rests on a stone foundation. A gable-roofed garage is also located on the roughly 9-acre lot.

3.3.2 Historic Context

Throughout the eighteenth century, most residential settlement was concentrated in the western and southern parts of the present-day Town of Aquinnah, which constituted the reservation lands of the Wampanoag Tribe of Gay Head (Aquinnah). Individual residences were linked by a network of paths, and by the mid-nineteenth century, several east-west roads connected the residential areas to the Gay Head Light and Clay Cliffs of Aquinnah to the west and the present-day Town of Chilmark to the east (Harrington, 1998a). In the 1860s, the "District of Gay Head" was established by the Massachusetts General Court. The district was incorporated as the Town of Gay Head in 1870, despite the objections of the Wampanoag residents, who viewed the town's creation as the alienation of their lands in violation of the Federal Non-Intercourse Act of 1790 (WTGHA, 2022). At the time, tribal members accounted for all of the town's 227 residents, and the survey and privatization of their land allowed non-tribal owners to acquire property in the town. By 1895, at least 18 non-tribal individuals owned land in the Town of Gay Head, and that number would increase in the following decades. The year-round (primarily Wampanoag) population declined during the twentieth century as communal economic systems dependent on fishing and agriculture waned. Meanwhile, visitation from off-island residents increased dramatically, and many new residences were constructed for use as summer rentals or vacation homes (Harrington, 1998a).

The residence at 71 Moshup Trail was built in approximately 1920. Its primary elevation faces northeast, towards a now-inaccessible extension of Old South Road which provided access to a small number of residences in the area during the early twentieth century. The current roadway, Moshup Trail, was built in 1956, extending east from Aquinnah Circle and providing access to home sites and points of interest along the town's south shore (Harrington, 1998b).

3.3.3 NRHP Criteria and the Maritime Visual Setting

71 Moshup Trail appears to meet National Register Criterion C as a typical example of an early twentieth-century residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual setting are a key component of its historic significance as an early-twentieth-century vernacular seaside residence.

3.4 The Leonard Vanderhoop House

3.4.1 Physical Description and Existing Conditions

The Leonard Vanderhoop House, located at 5 Church Street, is a one-and-one-half-story Greek Revival-derived vernacular residence with multiple additions sited on approximately 5.6 acres. The primary volume consists of a gable-and-ell modified (after 1998) with the addition of wall dormers. A small single-story addition to the west has a flat roof supporting an open deck. The exterior is clad in wood shingle and the roof is of asphalt shingle. The primary elevation faces northeast to an unpaved extension of Church Street.

3.4.2 Historic Context

The Leonard Vanderhoop House was built in approximately 1850 and was one of several residences, along with a school, church, and parsonage, which formed the nucleus of the Gay Head community along present-day Old South Road during the mid-nineteenth century. Leonard L. Vanderhoop (1855-1934), the earliest identified resident of the house, was a restaurant owner and Town Treasurer. The Vanderhoop family, descended from Leonard's parents William A. Vanderhoop and Beulah Salsbury, are a prominent Aquinnah family whose members own many properties and have held key positions in the town government as well as in the Wampanoag Tribe of Gay Head (Aquinnah) (Harrington, 1998c).

In 1870, the same year that the Town of Gay Head was incorporated, the improvement of present-day State Road by the State of Massachusetts dramatically altered the development patterns within the town. The new road was laid out north of Old South Road along the existing path that connected Chilmark to the east to the Gay Head Lighthouse. Nearly all of the existing buildings were subsequently moved from the older community around Old South Road to the new center of activity around the intersection of State Road and Church Street. By 1926 only a single unoccupied house remained at the old settlement (Harrington, 1998a). The Leonard Vanderhoop House was relocated during this period to its current site at 5 Church Street. It remains in the Vanderhoop family today.

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Leonard Vanderhoop House has been significantly altered with the replacement of windows and doors and the introduction of wall dormers. However, it retains its overall massing and its historic setting. The house's relocation after 1870 in response to changing settlement patterns contributes to its historic significance. The Leonard Vanderhoop House appears to meet National Register Criterion A for its association with the mid-nineteenth century settlement along Old South Road. The Vanderhoop family is one of the most well-known families in the history of the Town of Aquinnah. The house is a Shingle-style building, typical of the buildings located on Martha's Vineyard, and has views to the water afforded by its relatively high elevation on the moraine. The remaining ocean views are associated with a once more expansive ocean viewshed that has been partially screened by reforestation.

3.5 The Tom Cooper House

3.5.1 Physical Description and Existing Conditions

The Tom Cooper House, located at 1 Sunset Lane, is a two-story residence consisting of a primary gable-roofed volume with multiple additions sited on approximately 0.5-acre. The exterior is clad in wood shingle and the roofs are clad in asphalt shingle. The residence appears to have been heavily remodeled in about 2005. All of the windows and doors appear to be modern replacements. Other alterations include the addition of a hipped-roof volume atop a walk-out basement, the enlargement of the original volume with wall dormers, and the addition of a visually prominent stone chimney.

3.5.2 Historic Context

Sunset Lane is a short road extending south from State Road. It was developed in the early-twentieth century, following the improvement of State Road. The Tom Cooper House was built during the last quarter of the nineteenth century. Tom Cooper was the first known occupant of the house, during the early twentieth century. The Cooper family operated a restaurant out of the residence in the 1920s, later converted to an ice cream shop in the 1960s (Harrington, 1998d). The building was substantially remodeled in approximately 2005 (Town of Aquinnah, 2022).

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Tom Cooper House appears to meet National Register Criteria A and/or C for its architecture and its role as a restaurant contributing to the development of the tourism industry in Gay Head. The natural landscape and maritime visual setting appear to be key components that contribute to the historic significance of the Tom Cooper House.

3.6 The Theodore Haskins House

3.6.1 Physical Description and Existing Conditions

The Theodore Haskins House, also known as the C. Adrian Vanderhoop House, located at 72 State Road/1150 State Road, is a one-and-one-half-story Colonial Revival-derived vernacular residence consisting of a gable-roofed main volume with multiple dormers and additions sited on approximately 1.0 acre. The exterior has wood shingle siding and an asphalt shingle roof, atop a concrete masonry unit foundation. A substantial brick chimney is located on the primary elevation. Windows are generally wood sash and appear original.

3.6.2 Historic Context

The Theodore Haskins House was built in the first quarter of the twentieth century for Theodore E. Haskins, who subsequently sold the property to C. Adrian Vanderhoop (1880-1956), a member of the prominent Vanderhoop family of Gay Head (see Section 3.3.2). In 1957, the property was acquired by the Gentry family, who still own it today (Harrington, 1998e; Town of Aquinnah, 2022).

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Theodore Haskins House appears to meet National Register Criterion C as an intact and representative example of an early-twentieth-century residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England with views to the ocean. The property is sited along the southwestern flank of an elevated glacial moraine with slopes oriented towards the Project. The remaining ocean views from the property are surviving elements of a once more expansive ocean viewshed that has been diminished by post-1950 reforestation.

3.7 3 Windy Hill Drive

3.7.1 Physical Description and Existing Conditions

The house at 3 Windy Hill Drive (current address, 5 Windy Hill Drive) is a two-story Colonial Revival-derived vernacular residence with hipped roofs, wood shingle siding, and a raised basement, sited on approximately 0.5 acre. The residence was significantly remodeled in the late-twentieth- or early-twenty-first century, with little or no historic exterior materials remaining.

3.7.2 Historic Context

The house at 3 Windy Hill Drive was built in the first quarter of the twentieth century. It was originally accessed via a network of trails and roads which extended south from Old South Road. Windy Hill Drive is now accessible from Moshup Trail, which was begun in 1956 to provide access to residential lots and points of interest on the town's south shore (Harrington, 1998f; Town of Aquinnah, 2022).

3.7.3 NRHP Criteria and the Maritime Visual Setting

The address 3 Windy Hill Drive appears to meet National Register Criterion C as an intact and representative example of a residence in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England, and in particular Martha's Vineyard with views to the ocean. The natural landscape and maritime visual setting appear to be key components that contribute to the historic significance of 3 Windy Hill Drive.

3.8 The Edwin DeVries Vanderhoop Homestead

3.8.1 Physical Description and Existing Conditions

The Edwin DeVries Vanderhoop Homestead, located at 35 Aquinnah Circle, is a two-story wood-frame vernacular residence with complex massing consisting of multiple intersecting gable roofed volumes along with a single-story rear addition. The building has wood shingle siding, wood shingle roofing, and a granite foundation. Windows are generally two-over-two double hung wood sash with simple wood surrounds. The primary (north) elevation is arranged symmetrically, with two single-story entry porches flanking a two-story gable-roofed one-bay-wide projection. A 12-footby-29-foot open terrace (built in 2005) along the rear elevation of the of the house and provides expansive views of the ocean waters framed by the slightly elevated sections of the cliffs to the north. The existing terrace replaced a wooden deck. The residence is sited on an approximately 3.8-acre lot which extends southwest to the Clay Cliffs of Aquinnah and consists of grass lawn, mown fields, and low vegetation.

The house consists of two main side-gable volumes which are offset and are each roughly the size of a modest Cape Cod-style residence of the nineteenth century. The presence of a full basement beneath one of the volumes and the absence of a basement beneath the other suggests that one of the volumes may have been relocated from a previous site. Historic imagery shows that a barn and several additional outbuildings were once located on the property but are no longer extant (Parcon et. al., 2006). A public walking trail leads through the property to the shoreline. The property is owned by the Town of Aquinnah

and managed as part of the 49-acre Aquinnah Headlands Preserve, while the building serves as the Aquinnah Cultural Center and Aquinnah Wampanoag Indian Museum (MVLB, 2016; Aquinnah Cultural Center, 2021).

3.8.2 Historic Context

The Edwin DeVries Vanderhoop Homestead was built or assembled from one or more existing buildings between 1890 and 1897. Edwin DeVries Vanderhoop (1848-1923) was one of nine children born in Gay Head to William Adriaan Vanderhoop, a Dutch-Surinamese settler, and Beulah Salsbury, a member of the Wampanoag Tribe of Gay Head (Aquinnah). Edwin D. Vanderhoop worked as a whaling captain and served in the Massachusetts legislature. He purchased the lot upon which his homestead stands in 1890. His widow Mary A.C. Vanderhoop (1860-1935) inherited the homestead upon his death and the property remained in the Vanderhoop family until 2003. In that year, the property was sold to the Marsh Hawk Land Trust and subsequently transferred to the Town of Aquinnah, subject to conservation and preservation restrictions (Parcon et. al., 2006). The building has been rehabilitated since that time.

3.8.3 NRHP Criteria and the Maritime Visual Setting

The Edwin DeVries Vanderhoop Homestead meets National Register Criteria A and C in the areas of Architecture, Native American Ethnic Heritage, and Social History. It derives significance from its association with the prominent Vanderhoop family of the Wampanoag Tribe of Gay Head (Aquinnah), from its association with civic and social life in the community, and as a representative example of a late-nineteenth-century residence embodying the building traditions of coastal New England. The period of significance is circa 1890/1897 to 1956 (Parcon et. al., 2006). The rear of the residence and surrounding areas of the property retain views of the Atlantic Ocean to the south. The property's location atop the Gay Head Cliffs and the views to the sea are integral to its historic setting.

3.9 Gay Head – Aquinnah Town Center Historic District

3.9.1 Physical Description and Existing Conditions

The Gay Head – Aquinnah Town Center Historic District is a collection of 23 contributing buildings, two contributing objects, and five non-contributing buildings grouped near the intersection of State Road and Church Street, at the approximate geographic center of the Town of Aquinnah. The contributing buildings consist of historic public, semi-public, residential, and agricultural buildings related to the civic, religious, and economic development of the Town of Aquinnah in the nineteenth and early twentieth centuries. The 23 contributing buildings are enumerated in Table 3.9-1.

Table 3.9-1. Contributing buildings within the Gay Head – Aquinnah Town Center Historic District

Building Name and/or Description	Address	Construction Date
The Aquinnah Town Hall/Community Center is a single-story end-gable building with a moderately pitched roof, wood shingle siding, and wood windows and doors. The primary (south) elevation consists of a projecting entry vestibule featuring a double leaf paneled door flanked by six-over-six windows. The east and west elevations include single-story ells and additions which are consistent with the form and materials of the main volume.	955 State Road	Circa 1929
The former post office and residence is a small single-story shed-roofed building with a roughly square plan and wood shingle and wood board siding. The building appears to have been unoccupied since at least the late 1990s and is overgrown with vegetation.	980 State Road	Circa 1920s
The Aquinnah Public Library/Gay Head School is a single-story Greek Revival-style end-gable building with wood shingle siding atop a granite foundation. The building has six-over-six windows and modest wood cornice returns, corner boards, and fascia boards. A wood deck and ramp added in the twenty-first century provide access to the library's main entrance on the south elevation. The primary historic entrance is on the north elevation and consists of a hipped-roof vestibule with doors on the east and west, which recall the building's use as a school from the time of its construction until 1968. The building was moved to its present location in 1878 (Harrington, 1998a).	1 Church Street	Circa 1844
The Gay Head Community Baptist Church is a one-and-one-half-story end-gable Greek Revival-style church with a square tower centrally located on the primary (south) elevation. The moderately-pitched roof is clad in asphalt shingle and the building has wood clapboard siding and Greek Revival-style wood cornice returns, corner boards, and fascia boards, atop a granite foundation. The outhouse located northeast of the church is also a contributing building to the historic district. It is not known whether the outhouse is still standing. The church was moved to its present location in 1907 (Harrington, 1998a).	2 Meetinghouse Way	Circa 1850

Building Name and/or Description	Address	Construction Date
The Minister's House/Parsonage is a one-and-one-half-story end-gable residence with modest Greek Revival-style detailing. The building has wood shingle siding and simple cornice returns, corner boards, and fascia boards, atop a stone foundation. The primary (north) elevation is three bays wide, with an offset door and two six-over-six windows at the first floor, with two additional six-over-six windows in the gable end. A secondary entrance is located in a single-story rear addition. The parsonage was moved to its present location in 1907 along with the church (Harrington, 1998a).	3 Church Street	Circa 1856
The Linus S. Jeffers Residence is a one-and-one-half-story Cape Cod-derived vernacular residence with gable-and-ell massing, wood shingle siding, shed dormer windows, and an enclosed single-story porch.	4 Jeffers Way	Late-nineteenth century
The Isaac Rose/Charlie Vanderhoop House, Barn, Cottage, and Shed/cottage comprise a nineteenth-century farmstead sited on approximately 3.7 acres. The residence is a one-and-one-half-story cross-gabled Victorian Eclectic-derived vernacular building with wood shingle siding, ornate sawn vergeboards, an enclosed porch, and a circa-2005 addition.	38 South Road / 890 State Road	Mid-nineteenth century
The Adriaan Vanderhoop House, Barn, and Outhouse comprise a nineteenth-century farmstead sited on approximately 3.1 acres. The residence is a small single-story gable-roofed vernacular building with a central brick chimney, wood shingle siding, two-over-two windows, and a plank door.	46 South Road / 962 State Road	Late nineteenth century
The Lyman Madison House is a one-and-one-half-story vernacular residence with an end gable orientation, wood shingle siding, and a three-bay primary elevation with an offset door.	57 South Road / 903 State Road	Late nineteenth century
The house at 59 South Road/905 State Road is a one-and-one-half-story former boathouse clad in wood shingle atop a raised concrete block foundation. The building has a narrow gable-roofed wall dormer on the south elevation and a single-story wing on the east.	59 South Road / 905 State Road	Circa 1900
The Totem Pole Inn property consists of six buildings on an approximately 6.9-acre parcel, including an Innkeeper's Residence, four cottages, and a shed. The Innkeeper's Residence is a one-and-one-half-story Craftsman-style residence with wood shingle siding, a dormered gable roof, and an inset porch with cobblestone piers. The cottages are stylistically varied but are unified though their use of wood shingle sliding and cobblestone foundations. The shed also has wood shingle siding.	1-9 Totem Pole Way	Circa 1920s

The two contributing objects within the historic district are World War I monuments erected in 1918 and 1919 and currently located in front of the Aquinnah Town Hall. The monuments consist of bronze plaques affixed to boulders. According to the west monument's inscription, the Town of Gay Head (Aquinnah) contributed the "largest number of men in proportion to its population of any town in New England" to serve in the United States armed forces during the war.

Two of the five non-contributing buildings within the historic district are part of the complex of municipal buildings at 955 State Road. The Town Office Building (1989), east of the Town Hall, is a single-story gable-roofed building with wood shingle siding and six-over-six windows. East of the Town Office Building, the Fire Station (circa 1959) is a single-story gable-roofed building with wood shingle siding. Both buildings recall the scale, form, and materials of the 1929 Town Hall. The remaining three noncontributing buildings within the historic district are residences at 2 Jeffers Way, 44 South Road/920 State Road, and 61 South Road/ 917 State Road, all constructed in the 1960s or later.

3.9.2 Historic Context

Throughout the eighteenth century, most residential settlement was concentrated in the western and southern parts of the present-day Town of Aquinnah, which constituted the reservation lands of the Wampanoag Tribe of Gay Head (Aquinnah). Individual residences were linked by a network of paths, and by the mid-nineteenth century, several east-west roads connected the residential areas to the Gay Head Light and Clay Cliffs of Aquinnah to the west and the present-day Town of Chilmark to the east. Throughout the late eighteenth and nineteenth centuries, the community's population was roughly 200 (Harrington, 1998a).

The Gay Head community's civic and religious functions primarily took place within private residences until the mid-nineteenth century. The town's first and only purpose-built school building (now, the Aquinnah Public Library) was constructed prior 1844 north of present-day Old South Road. It was used for a variety of civic, social, and religious purposes in the years and decades before the community erected additional public buildings, and town records show that maintenance and upgrades to the building were frequent. The Baptist congregation of Gay Head met in the school before the Gay Head Community Baptist Church was constructed just north of the school in 1850. Within a few years, the Massachusetts Missionary Society supplied funding for a parsonage which was constructed in 1856 in order to attract a year-round minister to the church. The school, church, and parsonage, along with several additional residences, formed the nucleus of the Gay Head community along Old South Road in the mid-nineteenth century (Harrington, 1998a).

In the 1860s, the "District of Gay Head" was established by the Massachusetts General Court. The district was incorporated as the Town of Gay Head in 1870, despite the objections of the Wampanoag residents, who viewed the town's creation as the alienation of their lands in violation of the Federal Non-Intercourse Act of 1790 (WTGHA, 2022). At the time, tribal members accounted for all of the town's 227 residents, and the survey and privatization of their land allowed non-tribal owners to acquire property in the town. By 1895, at least 18 non-tribal individuals owned land in the Town of Gay Head, and that number would increase in the following decades (Harrington, 1998a).

In the same year that the Town of Gay Head was incorporated, the improvement of South Road (now, State Road) by the State of Massachusetts dramatically altered the development patterns within the town. The new road was laid out north of Old South Road along the existing path that connected Chilmark to the east to the Gay Head Lighthouse. Several buildings were subsequently moved from the older community around Old South Road to the new center of activity around the intersection of South Road and Church Street. The school was relocated in 1878, while the church and parsonage were relocated in 1907. Several additional residences were also moved during this period, and by 1926 only a single unoccupied house remained at the old settlement (Harrington, 1998a).

A post office serving the new Town of Gay Head was established in 1873 and operated out of a succession of private residences, including the Linus S. Jeffers Residence, throughout its roughly 70-year existence. The Post Office/Residence at 980 State Road was likely constructed in the 1920s as a seasonal gift shop and served as the post office and postmistress' residence from the 1930s until the post office was closed during the Second World War. The building presumably continued to serve as a residence following the post office's closure; however, by the late 1990s, the building had been vacant for some time (Harrington, 1998a).

There were no purpose-built town offices in Gay Head until 1929 when the current Town Hall was constructed. Previously, town meetings had been held in the school and town officials rented space in the nearby Linus S. Jeffers residence, which also served as a grocery store and town post office. Linus Jeffers served on the Board of Directors of the Gay Head Improvement Association, which raised funds for the construction of the new Town Hall. The building was designed by Vineyard Haven architect Herbert C. Hancock. Since its construction, the building has housed many of the town's social gatherings since it has the largest capacity of any buildings within the town (Harrington, 1998a).

The year-round (primarily Wampanoag) population declined during the twentieth century as communal economic systems dependent on fishing and agriculture waned. Meanwhile, visitation from off-island increased dramatically, and many new residences were constructed for use as summer rentals or vacation homes. A group of cottages known as the Totem Pole Inn was built during this period just east of the intersection of State Road and Church Street. Gay Head's town center continued to grow in order to meet the changing community's needs. The town was without a dedicated fire department until the fire station was constructed to the east of the Town Hall in about 1959 or 1960; it is still in use today. The town's library was shuffled back and forth between the school and the Town Hall multiple times over several decades before the school closed in 1968 and the town's children began attending larger schools in Chilmark and Vineyard Haven. In 1975, the school was used as additional town office space while a substantial addition was made to the Town Hall. In the same year, the school was permanently converted into the town library and it continues to serve that function today. In the late 1980s, the town once again was in need of additional office space, and a new town office building was built east of the existing Town Hall. Additional alterations were made to the 1975 addition in 1992-1993 to house the town police barracks. The town's name was changed from Gay Head to its Wampanoag name, Aquinnah, in 1998 (Harrington, 1998a).

In general, the buildings comprising the Gay Head – Aquinnah Town Center Historic District continue to be utilized by the community for their original purposes. While the Aquinnah Public Library no longer functions

as a school, it continues to be a center of activity and is well cared for by the community. A large deck and accessible ramp were recently added to the building. The Town Hall has likewise undergone maintenance and repairs in recent years. The Gay Head Community Baptist Church is the only extant church building in the Town of Aquinnah. The Post Office/Residence remains vacant. The Gay Head – Aquinnah Town Center Historic District was listed in the NRHP in 1999 (nomination completed in 1998) and in 2001, the boundary was increased to include an additional 17 contributing buildings and three noncontributing buildings (Harrington and Friedberg, 2001).

3.9.3 NRHP/NHL Criteria and the Maritime Visual Setting

The Gay Head – Aquinnah community's historic relationship with and dependence upon maritime resources is integral to understanding the history and development of the historic district. The Gay Head – Aquinnah Town Center Historic District meets National Register Criteria A and C in the areas of architecture, community planning, and Native American ethnic heritage as an intact group of civic, residential, and religious buildings representing nineteenth- and twentieth-century settlement in the Town of Gay Head. The district's period of significance is circa 1850 (the construction date of the earliest building in the district, the Aquinnah Public Library) to 1951 (50 years prior to the NRHP boundary expansion in 2001; Harrington and Friedberg, 2001). The fire station was not included in the 1998 NRHP nomination because it had not yet reached 50 years of age; however, it retains a high degree of integrity and could be considered a contributing resource to the historic district. Although the library, church, and parsonage have been relocated from their original sites, they meet Criteria Consideration B because their relocation took place during the period of significance and was directly related to the growth of the town center and shifts in development patterns in the late nineteenth and early twentieth centuries. The district is sited on the elevated highlands of a prominent moraine. The surviving ocean views are important surviving elements of a once-more expansive pastoral maritime setting for the district.

3.10 Gay Head – Aquinnah Shops

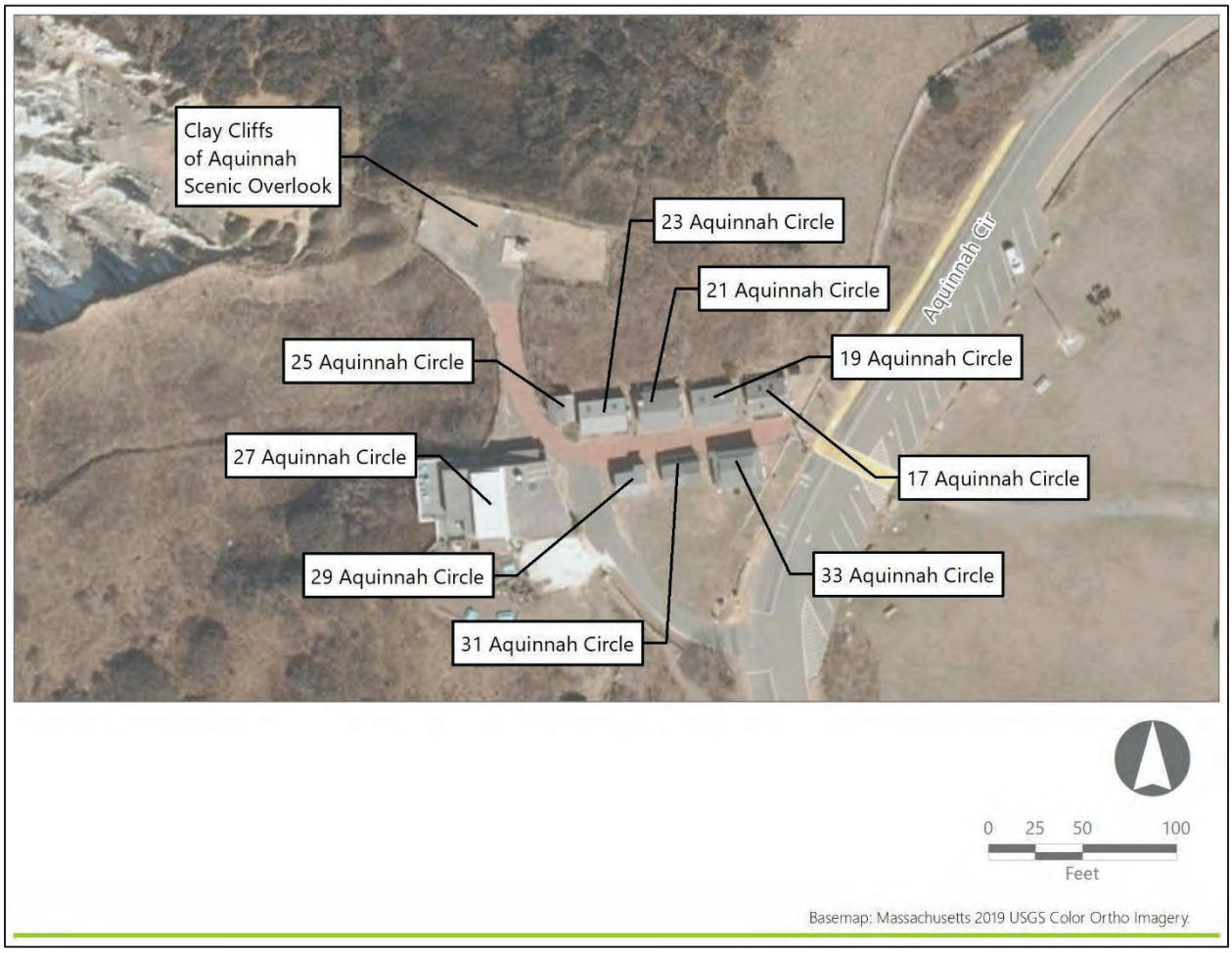
3.10.1 Physical Description and Existing Conditions

The Gay Head – Aquinnah Shops are a group of nine vernacular commercial buildings clustered around a paved walkway leading from a parking area along Aquinnah Circle to the Clay Cliffs of Aquinnah Scenic Overlook (see Figure 3.1-1). All buildings are of similar scale, form, and materials, generally consisting of simple rectangular volumes with gable or hipped roofs and wood-shingle siding. The buildings are sited on two tax parcels comprising approximately 4.8 acres, which comprise the entirety of the Property. The buildings occupy limited portions of the parcels, leaving large areas of open space consisting of low-growing vegetation.

The brick paved walkway which forms the central spine of the Property is accessed from Aquinnah Circle via a short flight of concrete stairs with painted wood handrails. From east to west, the buildings north of the walkway are numbered 17, 19, 21, 23 and 25 Aquinnah Circle. The buildings south of the walkway, from east to west, are numbered 33, 31, 29, and 27 Aquinnah Circle. The westernmost building, 27 Aquinnah

Circle, is separated from the other buildings by an asphalt vehicle access drive which functions as an alternative, stair-free path to the overlook.

Figure 3.10-1. Aquinnah Shops Site Map



Existing conditions and alterations since the Gay Head – Aquinnah Shops were documented in 1998 (Harrington, 1998) are described for each building:

- The building at 17 Aquinnah Circle (circa 2005) is a single-story building with a rectangular footprint, a moderately pitched gable roof clad in wood shingles, and exterior wood shingle wall cladding. The primary (south) elevation features a centered two-leaf entry door flanked by small windows. This entry is accessed by a wood ramp. The east elevation has a secondary entrance. The building does not appear in aerial imagery dated to 2001 and appears to have been completely rebuilt in approximately 2005 (Harrington, 1998b; MassGIS, 2001, 2005).
- The building at 19 Aquinnah Circle (early- to mid-twentieth century) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation has a deep eave overhand and features a centered two-leaf

entry door flanked by paired one-over-one windows. The entry is raised three steps from the paved walkway. The doors and windows have been replaced since 1998 but retain their approximate size and position (Harrington, 1998b).

- The building at 21 Aquinnah Circle (circa 2005) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation has three pairs of sliding service windows sheltered by an open porch. The building appears to have been completely rebuilt in approximately 2005 and does not appear in aerial imagery dated to 2001 (Harrington, 1998b; MassGIS, 2001, 2005).
- The building at 23 Aquinnah Circle (circa 1950s) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (south) elevation features a centered two-leaf entry door flanked by large windows. The entry is raised two steps form the paved walkway. The south elevation windows were replaced after 1998, when they consisted of paired three-light casement windows (Harrington, 1998b).
- The building at 25 Aquinnah Circle (circa 2013) is the smallest of the Gay Head – Aquinnah Shops buildings and is set back farther from the walkway than 17-23 and 29-33 Aquinnah Circle. It is a single-story building with an approximately square footprint, a low gable roof clad in wood shingle, and exterior wood shingle or bark wall cladding. It has been completely rebuilt since 1998 and does not appear in aerial imagery dated to 2011-2012 (Harrington, 1998b; MassGIS, 2011-2012, 2013-2014).
- The building at 27 Aquinnah Circle (mid-twentieth century) is the largest of the Gay Head – Aquinnah Shops buildings and occupies a separate tax parcel from the rest of the shops. It is a one-and-one-half-story building with a roughly rectangular footprint, a low gable roof clad in asphalt shingle, and exterior wood shingle wall cladding. It has two small shed additions and a shed dormer. The primary (east) elevation has an entrance within an inset porch and a pair of sliding service windows. The building houses a restaurant with indoor and outdoor seating areas, including a large wood deck and concrete patio. It does not appear to have been altered significantly since 1998 (Harrington, 1998b).
- The building at 29 Aquinnah Circle (circa 2015) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingle, and exterior wood shingle wall cladding. It has been completely rebuilt since 1998 and does not appear in aerial imagery dated to 2015 (Harrington, 1998b; Town of Aquinnah, 2022).
- The building at 31 Aquinnah Circle (mid-twentieth century; rebuilt or enlarged circa 2008) is a single-story building with a rectangular footprint, a low gable roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (north) elevation has double leaf, nine-light wood entry doors and a large fixed-sash window. The entry is raised two steps from the paved walkway. The building has been enlarged (or rebuilt) and the north elevation has been altered since 1998, when the entry doors were centered and flanked by two small windows (Harrington, 1998b; MassGIS, 2005, 2008).
- The building at 33 Aquinnah Circle (circa 1950s; possibly rebuilt circa 2000) is a single-story building with a rectangular footprint, a gable-on-hip roof clad in asphalt shingles, and exterior wood shingle wall cladding. The primary (north) elevation has four service windows. A single-light door and a

large window are located on the east elevation. The building has been substantially altered or possibly rebuilt since 1998, when it had a hipped roof and an inset porch with a door on the north elevation (Harrington, 1998b; MassGIS, 1990s, 2001).

The buildings were observed to be in fair to good condition when they were documented in 1998 (Harrington, 1998b). The apparent rebuilding or substantial remodeling of six of the buildings since that date, as well as the replacement of many of the remaining buildings' windows and doors, is likely due to the buildings' ongoing exposure to harsh seaside conditions.

3.10.2 Historic Context

The Aquinnah Cliffs and Gay Head Light have been a tourist attraction since the nineteenth century. Several small shops and "tepees" catering to tourists were present along the cliffs by the early twentieth century but were relocated to the present site by the Town of Gay Head (now, the Town of Aquinnah) in order to preserve the setting of the overlook. The earliest extant building on the site was built in the early-to-mid-twentieth century, while the remaining buildings are believed to have been constructed from the mid-twentieth century to the early twenty-first century. The form, scale, and materials of the buildings have been consistent with the vernacular building traditions of coastal New England: modest in size, with low-to-moderate gable roofs, shallow roof eaves, simple doors and windows, and shingle cladding. Historically, the shops sold souvenir items including Wampanoag crafts and objects made from the local clay (Harrington, 1998b).

The Gay Head Cliffs, comprising 24 acres under municipal and Wampanoag trust ownership, were designated as a National Natural Landmark by the National Park Service in 1965 (NPS, 2021). Gay Head Cliffs, including the Gay Head – Aquinnah Shops, was designated as a District of Critical Planning Concern by the Martha's Vineyard Commission (Dukes County). Construction within the district is subject to limitations in order to preserve the natural, ecological, cultural, and historic resources of the district (Town of Aquinnah, 2022). The Gay Head – Aquinnah Shops were surveyed by the Massachusetts Historical Commission in 1998. The same year, the name of the town and its namesake cliffs were changed from Gay Head to Aquinnah, their original Wampanoag name.

Today, the buildings are used primarily as seasonal restaurants and gift shops catering to the tourists who visit the Clay Cliffs of Aquinnah Scenic Overlook. Many of the businesses are multigenerational family enterprises owned by members of the Wampanoag Tribe of Gay Head (Aquinnah). As of 2015, tribal members had the right of first refusal to lease the building lots from the Town of Aquinnah (Elvin, 2015). The buildings now appear to be under a mix of individual and tribal ownership (Town of Aquinnah, 2022).

3.10.3 NRHP/NHL Criteria and the Maritime Visual Setting

As a historic district, the Gay Head – Aquinnah Shops meet National Register Criterion A for their association with the development of Aquinnah Cliffs as a tourist attraction during the late nineteenth and early twentieth centuries. The district also meets Criterion C as a group of intact twentieth-century commercial buildings in keeping with the characteristic scale, form, and materials of the vernacular building tradition of coastal New England. The natural landscape and maritime visual setting of the Aquinnah Cliffs, including

expansive views of the Atlantic Ocean, are key to understanding the Gay Head-Aquinnah Shops' historic significance as a commercial development directly tied to seaside tourism.

3.11 Gay Head – Aquinnah Coast Guard Station Barracks

3.11.1 Physical Description and Existing Conditions

The Gay Head – Aquinnah Coast Guard Station Barracks is currently located at 1147 State Road. The building is a one-and-a-half-story residential building set on a high stone foundation with stone support piers. The building is clad in wood shingles and two shed dormers are located on the north and south rooflines. A small, one-story addition is located to the east.

3.11.2 Historic Context

The building's exact construction date is unknown; however, it was originally a barracks located at the Coast Guard Station near the Gay Head Light. In 1870, South Road was constructed, and multiple buildings were relocated to the new roadway. According to the MHC Form, the Gay Head – Aquinnah Coast Guard Station Barracks was moved to its present location after World War II and was converted to a residence (Harrington, 1998g).

3.11.3 NRHP/NHL Criteria and the Maritime Visual Setting

As stated above, the Gay Head – Aquinnah Coast Guard Station Barracks was relocated from its original location, thus affecting its integrity of setting; however, the building retains its integrity of materials, workmanship, association, and design. The building is eligible for listing under Criterion A for its association with the United States Coast Guard Station in Aquinnah.

Although the Gay Head - Aquinnah Coast Guard Station Barracks was relocated from its original maritime setting, the building is currently sited on an elevated parcel of land with ocean views.

4.0 MITIGATION MEASURES

Mitigation measures at these historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Funding for Historic Preservation and Climate Adaptation Planning

4.1.1 Purpose and Intended Outcome

The 2021 *Dukes County Multi-Jurisdiction Hazard Mitigation Plan Update* identifies the reduction in loss or damage to cultural resources, including the eight historic properties identified in this HPTP, from natural hazards as an overall hazard mitigation goal (MVC, 2021). Identification of historic preservation priorities and goals within the Town and County's hazard plan and long-range climate adaptation measures will help preserve the character and setting of historic resources within the Town of Aquinnah while addressing anticipated threats to historic resources and their setting from climate change.

This HPTP proposes funding for the development of a Historic Preservation and Climate Adaptation Plan for the Town of Aquinnah which will include public engagement to identify historic preservation and climate adaptation priorities and concerns of the local community.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review existing town and county planning documents and regulations;
- Conduct public outreach in order to identify historic preservation priorities and concerns;
- Photograph and document (e.g. map) existing conditions;
- Draft a historic preservation and climate adaptation plan for distribution to the Participating Parties for review and comment;
- Develop a final plan to include comments from the Participating Parties; and
- Distribute the final plan to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the Scope of Work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of climate change and the treatment of historic properties. Public engagement sessions will be held to solicit comments, questions, and concerns from the residents of the Town of

Aquinnah. The sessions will inform the preparation of the draft plan which will be distributed to the Participating Parties for review and comment. Additional sessions should be held as necessary to allow for public engagement. The comments shall be addressed and incorporated in the final document which will be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with the following standards:

- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- Martha's Vineyard Commission's planning and climate change guidance, as applicable;
- Town of Aquinnah Community Preservation Committee guidance, as applicable;
- Town of Aquinnah Planning Bard Review Committee guidance, as applicable; and
- Town of Aquinnah Energy and Climate Committee guidance, as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Photography and documentation (e.g., mapping);
- Preliminary draft of the historic preservation and climate adaptation plan, including photographs and maps; and
- Final plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Funding for Energy Efficiency Improvements to the Town Hall

4.2.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to fund energy efficiency improvements to the Town Hall, a contributing resource to the Aquinnah Town Center Historic District. During Revolution Wind's Stakeholder Meeting with the Martha's Vineyard Commission to discuss this draft HPTP on February 1, 2022, the Martha's Vineyard Commission stated that energy efficiency and preservation of the Aquinnah Town Hall are important priorities. The intended outcome of this HPTP is to increase the energy efficiency and to help ensure the long-term preservation of this historic property.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Review existing town and county planning documents and regulations;
- Review existing energy efficiency guidance, including resources from the National Park Service's Technical Preservation Services and the National Trust for Historic Preservation;
- Photograph and document (e.g., map) existing conditions;
- Develop draft plans and specifications;
- Consult with Participating Parties;
- Develop draft plans and specifications to be distributed to the Participating Parties for review and comment;
- Develop a final plans and specifications to include comments from the Participating Parties;
- Distribute the final plans and specifications to the Participating Parties;
- Implement the improvements; and
- Develop as-built documentation to be distributed to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release an RFP for consultant and contracting services for the scope of work and select a consultant to perform the Scope of Work listed in Section 4.2.2. The preferred consultants and contractors will have experience in developing energy efficiency plans for historic buildings. The draft and final plans and specifications will be developed in consultation with the Participating Parties.

4.2.4 Standards

The project will comply with following standards:

- The Town of Aquinnah Building Code, as applicable;
- The Town of Aquinnah Energy and Climate Committee guidance, as applicable;
- The Secretary of the Interior's Standards for Rehabilitation (36 CFR 67.7); and
- National Park Service's *Improving Energy Efficiency in Historic Buildings* Preservation Brief 3.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP.
- Preliminary draft plans and specifications;
- Final plans and specifications; and
- As-built documentation including photographs.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Complete Identified Needs from the Americans with Disabilities Act (ADA) Compliance Plan

4.3.1 Purpose and Intended Outcome

The Aquinnah Circle and the Gay Head – Aquinnah Shops Area is identified in the Town of Aquinnah's 2019 *Community Preservation Committee Plan* as important to Wampanoag Tribe of Gay Head (Aquinnah) members, town residents, and visitors (Town of Aquinnah, 2019). The purpose of this mitigation measure is to complete the next phase of work identified in the proposed Americans with Disabilities Act (ADA) Compliance Plan for the Aquinnah Circle and the Gay Head – Aquinnah Shops Area (the ADA Compliance Plan) which is expected to be completed in the near future. The intended outcome of this measure is to ensure all visitors are able to access and enjoy the Gay Head – Aquinnah Shops. Revolution Wind discussed this proposed measure at the stakeholder meeting on February 18, 2022.

4.3.2 Scope of Work

The scope of work will consist of the following:

- Review the ADA Compliance Plan;
- Photograph and document existing conditions;
- Consult with Participating Parties;
- Develop draft plans and specifications to be distributed to the Participating Parties for review and comment;
- Develop final plans and specifications to include comments from the Participating Parties;
- Distribute the final plans and specifications to the Participating Parties;
- Implement the improvements; and
- Develop as-built documentation to be distributed to the Participating Parties.

4.3.3 Methodology

Revolution Wind will release an RFP for consultant and contracting services for the scope of work and select a consultant to perform the Scope of Work listed in Section 4.3.2. The preferred consultants and contractors will have experience in ADA Compliance and historic properties. The draft and final plans and specifications will be developed in consultation with the Participating Parties. Prior to any work, existing condition documentation, including photographs will be completed and distributed to the Participating Parties. The project will be implemented according to the final plans. At the completion of the project, as-built documentation, including photographs will be distributed to the Participating Parties.

4.3.4 Standards

The rehabilitation will comply with the following standards:

- Town of Aquinnah, MA Building Code, as applicable;
- Martha's Vineyard Commission's planning guidance, as applicable;
- ADA;
- The Massachusetts Office on Disability Guidelines as applicable; and
- The Secretary of the Interior's Standards and Guidelines for Rehabilitation (36 CFR 68).

4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Photographs and documentation of existing conditions;
- RFPs;
- Proposals by qualified consultants in response to the RFP.
- Preliminary draft of the construction plans including schedule, cost, and specifications to be distributed to the Participating Parties;
- Final construction plan to be distributed to the Participating Parties; and
- As-built documentation including photographs.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30 days to review and comment on all draft reports or other work products developed for this

[3] The timeline is subject to change and is based on current available information.

HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required:

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah Historic Properties, February 1, 2022; and
- Follow-up to the Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah Historic Properties, February 1, 2022 with the Martha's Vineyard Commission, March 18, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 14 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE GAY HEAD LIGHTHOUSE, TOWN OF AQUINNAH, DUKES COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 14 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Scrubby Neck Schoolhouse

Town of West Tisbury, Dukes County, Massachusetts

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Gay Head Lighthouse

Town of Aquinnah, Dukes County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
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Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Gay Head Lighthouse
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
SOI	Secretary of the Interior
USCG	United States Coast Guard
VERI	Vineyard Environmental Research Institute
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Gay Head Lighthouse, which is listed on the National Register of Historic Places (NRHP) (the Historic Property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
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- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

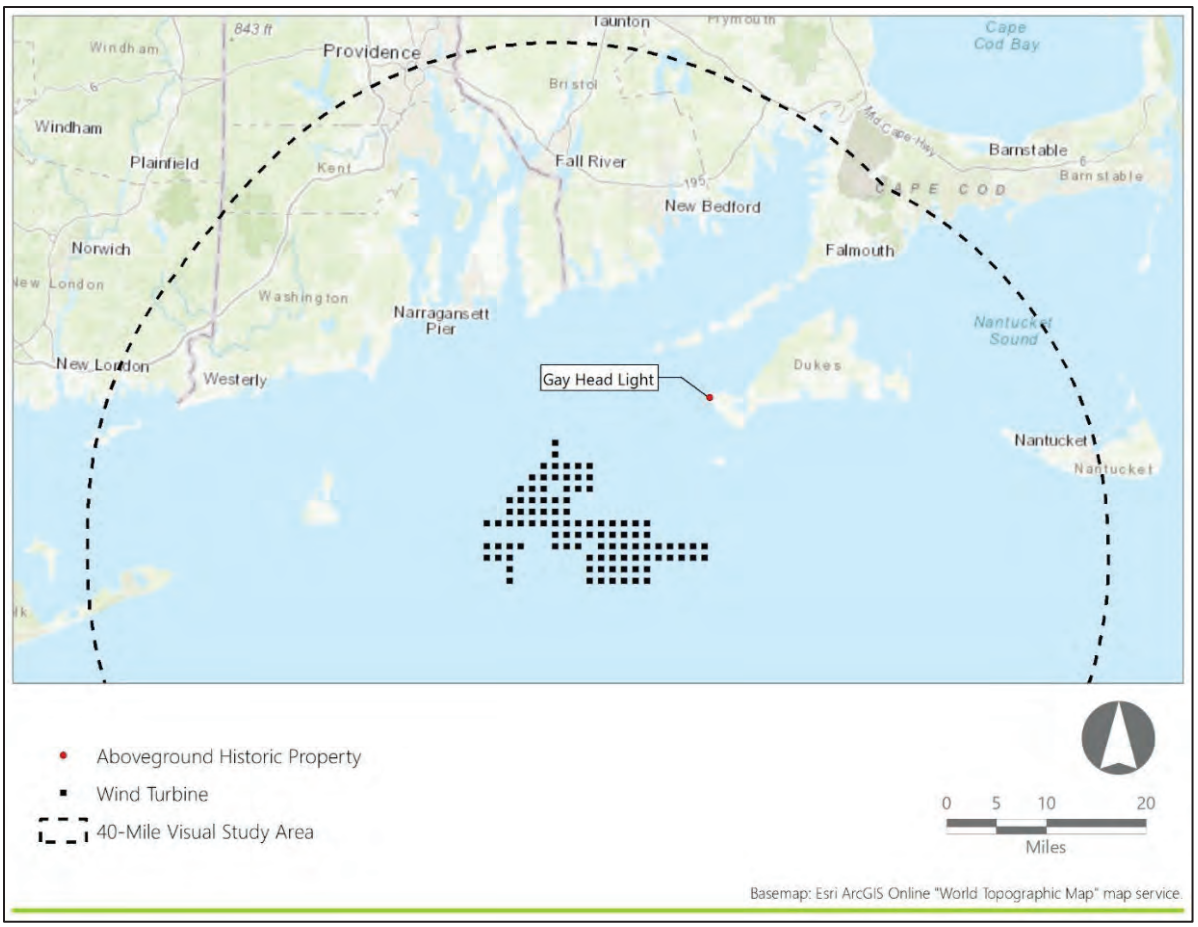
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historical commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33. The Massachusetts Historical Commission (MHC) holds a Historic Preservation Restriction and the United States Coast Guard (USCG) holds an Aid to Navigation Easement on the historic property per 10 USC 2668 Easements for Rights of Way. Any mitigation work associated with the historic property will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Wampanoag Tribe of Gay-Head Aquinnah
- The Martha's Vineyard Commission
- The Gay Head Lighthouse Advisory Committee
- The Town of Aquinnah
- The Massachusetts Historical Commission.[2]

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
The Gay Head Lighthouse	NRHP-Listed	Town of Aquinnah	MA	MHC #GAY 900 (MHC); GSA 1-X-MA-0877 (USCG); 87001464 (NPS)	Public	Lighthouses and Navigational Aids

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The Gay Head Lighthouse is considered within the HRVEA as historic property type "Lighthouses and Navigational Aids" which is defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

3.3 The Gay Head Lighthouse

3.3.1 Physical Description and Existing Conditions

Sited on 1.35 acres off Aquinnah Circle at the southwestern point of the Town of Aquinnah, the conical 1856 brick lighthouse sits just east of clay cliffs which overlook Devil's Bridge rocks. The lighthouse marks the entrance to Vineyard Sound from the south. In 2015, the structure was relocated 134 feet from its original location, away from the cliffs due to erosion concerns (Gay Head Lighthouse, 2018). The structure was placed on a new granite sub-foundation, at the same elevation as its original location (Unnamed, 2015).

The red brick tower shaft houses interior stairs and measures 17.5 feet in diameter and 45.7 feet in height (DiStefano, 1981). A mid-level balcony, corresponding to the interior lamp room, rests on a sandstone entablature and has iron railings. The glazed lens room with black iron structure contains the optic and sits atop the masonry with its own iron balcony (Tait, 1987). The lens room is enclosed by an iron roof with ventilator and lightning rod. A series of square four-pane windows perforate the building envelope at various heights around the circumference of the lighthouse. Recent improvements include replacement iron railings that match the original set, and repair to masonry damage where the lens room and balcony meet the brick (Gay Head Lighthouse, 2018).

Following the relocation of the Gay Head Lighthouse in 2015, cliff erosion was no longer the biggest threat to the structure. Due to age and maritime siting, the poor condition of the Gay Head Lighthouse building

materials is currently posing the largest risk to its long-term survival. The curtain wall of the lens room, as well as brick, sandstone, and mortar all display signs of deterioration (Gay Head Lighthouse, 2018).

3.3.2 Historic Context

The extant circa 1856 Gay Head Lighthouse is the second lighthouse on this site, a replacement for the original wood structure authorized in 1799 by President John Adams (DiStefano, 1981). By 1854, the original structure was being confused with the Sankay Light on Nantucket, resulting in a shipwreck. As a response to the tragedy, Congress allocated $30,000 for a new brick lighthouse, a first-order Fresnel lens from France, and a keeper's residence (demolished circa 1961). Caleb King of Boston constructed the new Gay Head Lighthouse and keeper's house using brick from the nearby Chilmark Brick Works. The lighthouse's reopening in 1856 was well publicized and tours opened to the public shortly thereafter (Gay Head Lighthouse, 2018).

Between 1856 and 1952 the Fresnel lens served as the lighthouse beacon, under the care of 18 principal keepers and 10 assistant keepers. The first Wampanoag Tribe of Gay Head (Aquinnah) member to serve as the Gay Head Lighthouse Keeper was Charles W. Vanderhoop, Sr. who served in that position from 1930-1933 (Gay Head Lighthouse, 2018). Following the introduction of electricity and an upgraded optic at the lighthouse, the USCG donated the Fresnel lens to the Martha's Vineyard Museum, and the keeper's house was demolished. With a fully automated beacon, the USCG began its operation of the Gay Head Lighthouse in 1956.

Under USCG stewardship, and with insufficient funds for maintenance, the condition of the Gay Head Lighthouse began its slow decline in the 1960s, continuing into the early 1980s. In 1984, Congressional hearings to save the Gay Head Lighthouse from demolition resulted in the licensure of a 35-year lease to the Vineyard Environmental Research Institute (VERI) who were given control of the management and maintenance of the property (Gay Head Lighthouse, 2018). The USCG continued to operate the navigational aid beacon through an access easement (see Section 2.2.2). VERI commenced fundraising activities to make repairs and re-open the lighthouse to the public, which was done in 1986, 30 years after its closure. Once again keepers and assistant keepers were appointed, including Charles Vanderhoop, Jr. who was born in the keeper's house. In 1994, VERI transferred its license to the Martha's Vineyard Museum, and in 2009 the Museum provided President Barack Obama a private tour of the property with his family (Gay Head Lighthouse, 2018).

Though cliff erosion was a decades-old problem at the Gay Head Lighthouse, it became an increased threat in 2010 when a portion of the perimeter fence tumbled down the cliff face. By 2012, the Save the Lighthouse Committee was formed to research options for the continued safety of the structure, including a potential relocation which was determined to be the solution. In 2013, the Gay Head Lighthouse was featured on the National Trust of Historic Preservation's list of 11 Most Endangered Places. Its inclusion on the list put in motion a years-long fundraising campaign for its relocation by International Chimney Corporation who recommended it occur no later than 2015. With funding in place, the move began on May 28, 2015, and finished on May 30, 2015, with the Gay Head Lighthouse's safety assured for another century (Gay Head Lighthouse, 2018).

The Town of Aquinnah filed for ownership of the property in 2015, as it was determined to be excess to the needs of the UCSG (General Services Administration, 2013). The deed to the town included a preservation easement and access restrictions, described in Section 2.2.2. The Gay Head Lighthouse Advisory Committee is a municipal department board which manages the property.

3.3.3 NRHP Criteria and the Maritime Visual Setting

In 1987, the Gay Head Lighthouse was listed on the NRHP as part of the Lighthouses of Massachusetts Thematic Resources Area (DiStefano, 1981). At the time of construction, it was considered one of the ten most important lights on the Atlantic Coast and contained one of the country's first Fresnel lenses. The Gay Head Lighthouse is significant under Criterion A as a historic maritime structure and aid to navigation. It is also significant under Criterion C as an outstanding example of nineteenth-century maritime architecture (Tait, 2017).

The site chosen for the lighthouse's 2015 relocation was consistent with the setting of the original, thereby allowing for the continued integrity of "association, setting, feeling and relationship to the Gay Head cliffs and to the ocean as an aid to navigation" (Unnamed, 2015). Therefore, the Gay Head Lighthouse continued to be NRHP-listed during and following its relocation. Since that time, physical improvements have been consistent with the Secretary of the Interior's (SOI) Standards (36 CFR 68) which have allowed the structure to retain integrity of materials, workmanship, and design.

As stated above, the Gay Head Light is located on the Gay Head Cliffs and "marks the Devil's Bridge rocks, the shoals of the south shore of the island and the entrance to Vineyard Sound from Buzzard's Bay" (Tait, 2017). Devil's Bridge extends over a mile from the cliffs and has been the site of numerous accidents. In 1838 the lighthouse was replaced, and the new light could be seen for more than 20 miles (D'Entremont, 2021). The need for a lighthouse at this location is evident, and despite the powerful and long-distance light, due to Devil's Bridge and the strong currents, shipwrecks continued to occur. The setting of the Gay Head Light is intrinsically linked to the water with its location high on the Gay Head Cliffs, marking Vineyard Sound and the Atlantic Ocean.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Rehabilitation of the Gay Head Lighthouse

4.1.1 Purpose and Intended Outcome

In consultation with the Town of Aquinnah and the Gay Head Lighthouse Advisory Board, this mitigation measure will help fund the next phase of rehabilitation at the Gay Head Lighthouse. As discussed at the Revolution Wind stakeholder meetings on February 1, 15 and 18, 2022. The Gay Head Lighthouse Advisory Board, a municipal board in the Town of Aquinnah, has commissioned a report identifying preservation and restoration needs for the lighthouse. The intended outcome is to ensure the long-term preservation of the lighthouse by completing physical repairs and/or restoration of the historic building materials according to the priorities identified by the report.

4.1.2 Scope of Work

The scope of work will be determined by the previously referenced report and in consultation with the Participating Parties. Prior to any work commencing, photographic and written documentation of the existing conditions will be recorded.

4.1.3 Methodology

Revolution Wind will release a request for proposals for consultant services and select a consultant to perform the scope of work. Drawings and specifications supporting the scope of work (see Section 4.1.2) will be developed in compliance with applicable standards (see Section 4.1.4). The project will require the mobilization of a qualified contractor that is experienced in the repair and restoration of historic lighthouses.

4.1.4 Standards

The scope of work will comply with following standards:

- Town of Aquinnah, MA Building Code;
- Martha's Vineyard Commission planning guidance, as applicable;
- Preservation Restriction (MGL Chapter 184, Section 31-33);

- United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005);
- The Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations;
- The Town of New Shoreham Historic District Commission;
- United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005);
- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- *Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings;*
- *National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation;*
- *Historic Lighthouse Preservation Handbook;*
- *IALA-AISM Lighthouse Conservation Manual;*
- Preservation Restriction (RIGL Title 42, Section 42-45-9); and
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- Proposed scopes of work including draft text, project plans, and design specifications;
- Photographic and written documentation of existing conditions;
- Draft specifications and construction drawings to be distributed to the Participating Parties for review and comment;
- Final Specifications and construction drawings to be distributed to the Participating Parties for review and comment; and
- A Summary Report of the work completed including photographs and as-built documentation to be distributed to the Participating Parties.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Massachusetts Historical Commission (MHC)

The scope of work will be submitted to the MHC under the terms of the Preservation Restriction.

5.2.4 Massachusetts State Historic Preservation Officer

The scope of work will be submitted to the Massachusetts State Historic Preservation Officer for compliance with the SOI Standards for Rehabilitation (36 CFR 68).

5.2.5 United States Coast Guard (USCG)

The scope of work will be submitted to the USCG for review to confirm that it complies with the terms of the ATON Access Easement.

5.2.6 Wampanoag Tribe of Gay Head (Aquinnah)

The Wampanoag Tribe of Gay Head (Aquinnah) may, at their sole discretion, participate in consultations for the development and finalization of the HPTP in recognition of the traditional cultural and religious significance of the historic property to the Tribe.

5.2.7 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah, February 1, 2022;
- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Gay Head Lighthouse, February 15, 2022;
- Follow-up to the Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah Historic Properties, February 1, 2022, with the Martha's Vineyard Commission, March 18, 2022; and
- Follow-up to the Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah, July 1, 2022 with the Martha's Vineyard Commission, March 18, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 15 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: CAPT. SAMUEL HANCOCK – CAPT. WEST MITCHELL HOUSE, RUSSELL HANCOCK HOUSE, RUSSELL HANCOCK HOUSE, ERNEST FLANDERS HOUSE, BARN, AND SHOP, SIMON MAYHEW HOUSE, ERNEST FLANDERS HOUSE, BARN, AND SHOP, AND FLAGHOLE, TOWN OF CHILMARK, DUKES COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 15 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Capt. Samuel Hancock - Capt. West Mitchell House
Russell Hancock House
Ernest Flanders House, Shop, and Barn
Simon Mayhew House
Flaghole
Town of Chilmark, Dukes County, Massachusetts

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Capt. Samuel Hancock - Capt. West Mitchell House Russell Hancock House Simon Mayhew House Flaghole Ernest Flanders House, Shop, and Barn
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
RFP	Request for Proposals
ROD	Record of Decision
RWEC	Revolution Wind Export Cable

RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft, applicant-proposed Historic Property Treatment Plan (HPTP) for the Capt. Samuel Hancock - Capt. West Mitchell House, which was determined by the Massachusetts Historical Commission (MHC) to be eligible for listing on the National Register of Historic Places (NRHP); Russell Hancock House, which is a MHC Historic Inventory Property; Simon Mayhew House, which is a MHC Historic Inventory Property; Flaghole, which is a MHC Historic Inventory Property; and the Ernest Flanders House, Shop and Barn, which is a MHC Historic Inventory Property, (the historic properties), provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (the Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
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- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
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- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder

engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

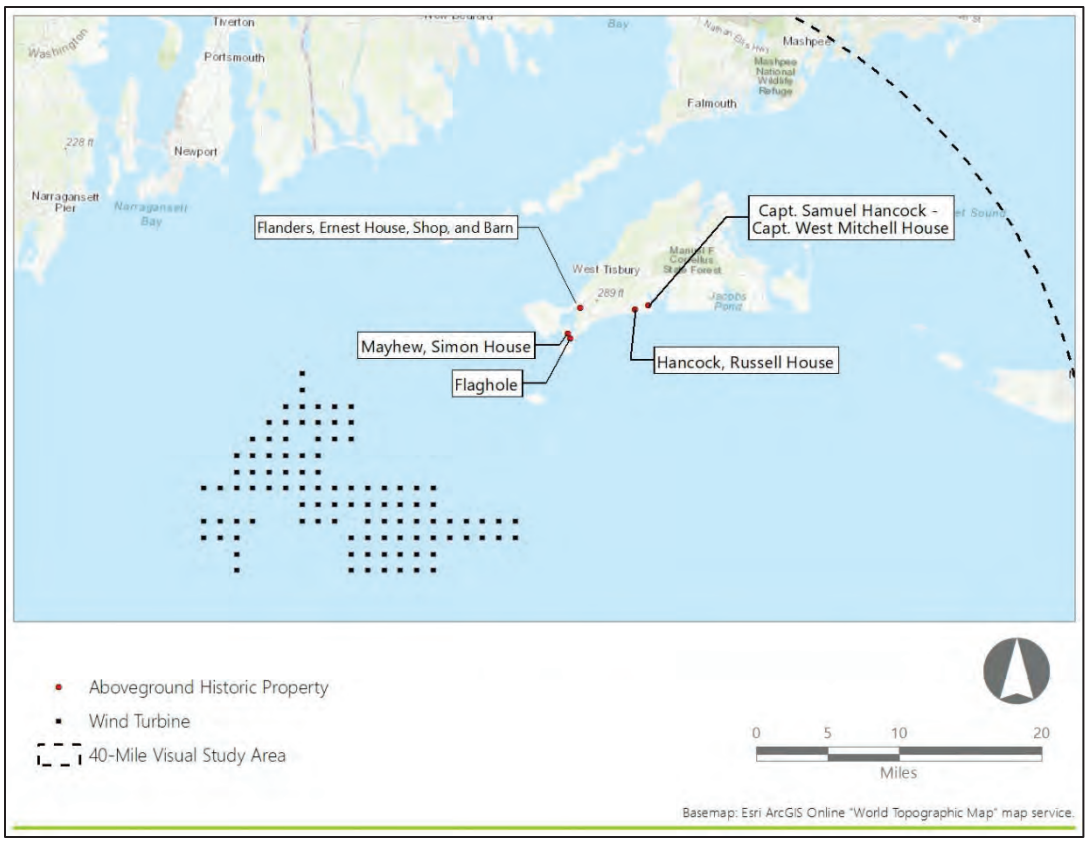
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Chilmark
- The Martha's Vineyard Commission
- The Massachusetts Historical Commission.[2]

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

Revolution Wind anticipates these parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS,HISTORIC SIGNIFICANCE, AND MARITIME SETTING

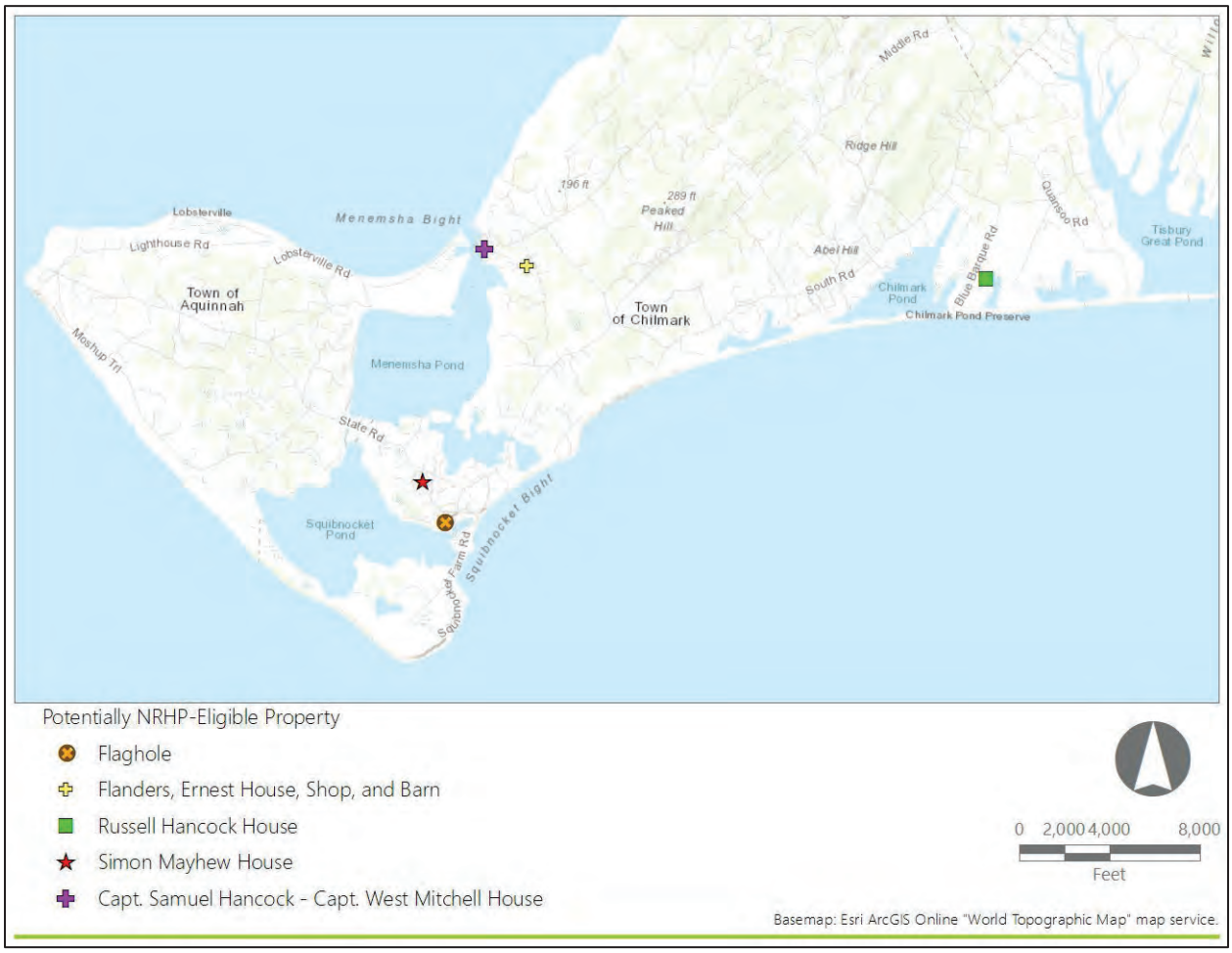
3.1 Historic Properties

This HPTP involves four historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Capt. Samuel Hancock - Capt. West Mitchell House	NRHP-Eligible (MHC Determined)	Chilmark	MA	CHL.35 (MHC)	Private	Historic Buildings and Structures
Russell Hancock House	MHC Historic Inventory			CHL.38 (MHC)	Private	
Simon Mayhew House	MHC Historic Inventory			CHL.4 (MHC)	Private	
Flaghole	MHC Historic Inventory			CHL.5 (MHC)	Private	
Ernest Flanders House, Shop and Barn	MHC Historic Inventory			CHL.11 CHL.80 CHL.81 (MHC)	Private	

Figure 3.1-1. Historic Property Locations



In Sections 3.3. through 3.6, each historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties included in this HPTP are included in the historic property type defined in the HRVEA as the "Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic

Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the Estates and Estate Complexes property type. These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 The Captain Samuel Hancock – Captain West Mitchell House

3.3.1 Physical Description and Existing Conditions

The Captain Samuel Hancock - Captain West Mitchell House, also known as the Mayhew-Hancock-Mitchell House, is a one-and-one-half-story Cape Cod-style house clad in shingles located on Quansoo Road in Chilmark, Massachusetts. The house is surrounded by open meadow and salt marshes and situated in an open field overlooking Tisbury Great Pond to the east and Black Point Pond to the south and west. The building features an L-shaped plan and sits on a stone foundation. Its side-gabled roof is clad in asphalt shingles from which two interior chimneys rise. The house has little-to-no architectural ornamentation. Fenestration includes two-over-two, six-over-six, and six-over-nine, double-hung windows set in plain surrounds. Doors feature rough vertical boards and latches. A flat-roofed porch is located on the south elevation. The oldest section of the house was built with wattle-and-daub walls, which, according to Adam Moore of the Sheriff's Meadow Foundation, only a few houses in the country still exhibit the technique today. The house is sited on the 146-acre Quansoo Farm, which is owned by the Sheriff's Meadow Foundation. A public walking trail at the site is maintained by the Martha's Vineyard Land Bank Commission. Future uses of the property may be as an educational center with educational programs set up through the Martha's Vineyard Museum (Acruti and Otterson 1998a; Elvin 2017).

3.3.2 Historic Context

The construction date of the Capt. Samuel Hancock - Capt. West Mitchell House is relatively unknown, with recent estimates ranging from 1656 to 1740, to as late as 1793. Original theories of the house (Arcuti and Otteson, 1998a) associate it with the Mayhew family, with some portions of the building being built by Reverend Thomas Mayhew, Jr. as a dwelling house for his family, or as a Wampanoag meeting house. Henry E. Scott, Jr. (1981) suggested that the western section of the main block of the Hancock-Mitchell House was

the original part, making a one or two room house. Based on this, the house was thought to date between 1654 (when Mayhew was given permission to build the house) and 1657 (when Mayhew died). According to Arcuti and Otteson (1998a), the Mayhew family resided in the house beginning in the mid-seventeenth century. It was also unclear if Thomas Mayhew, Jr.'s son, John Mayhew, made some building alterations or if a new house was constructed in place of the original house. Eventually, ownership of the house passed to John Mayhew's granddaughter, Deborah Mayhew Norton, who married Russell Hancock in 1766.

The Hancock family continued to expand the house, adding the rear ell during the early nineteenth century and enlarging the house to a full house. This circa 1836 expansion was likely executed by Captain Samuel Hancock, who operated the property as a farm. Later descendants of the Hancock family married into the Mitchell family. One of these descendants, Captain West Mitchell, captained one of the dozens of ships stranded in the Arctic Ocean in the Whaling Disaster of 1871. Descendants of the Mitchell family occupied the house until the 1980s. A major exterior restoration was completed in 2017 and included new cedar shingles, white-painted doors and windows, and a new bulkhead. The goal of the restoration was to restore it to its appearance in the first half of the nineteenth century, when it was owned by Captain Samuel Hancock (Arcuti and Otteson, 1998a; Elvin, 2017).

However, according to Richard L. Burt (2009), the original John Mayhew house was located near the Tiasquam River close to the village of West Tisbury, which was discovered by Burt in the 1970s. According to Burt (2009), a house is not mapped where the Hancock-Mitchell House now stands on the 1781 DesBarres' map, whereas other houses from this period were easily identified. Burt's deed research suggested that the first owner and builder of the Hancock-Mitchell House was James Hancock who bought the property in 1792. James Hancock was the son of Russell Hancock and Deborah Mayhew Norton. Oral histories from the late nineteenth century claim that Mrs. West Mitchell claimed that "her people had bought the place from the Mayhews before 1800 and it was a very old house at the time." Burt theorizes that this information is the basis for assigning the original owners to the Mayhews. He also makes room for the possibility that James Hancock purchased the older section of the house from the Mayhew family and moved it to its present location, as the Tiasquam River house originally built by John Mayhew does not appear to have been used as a residence after 1750. According to Burt (2009), "Additional research of the records and a thorough evaluation of the old farmhouse structure at Quansoo and its site will hopefully yield additional information on the origin and antiquity of this interesting old house."

3.3.3 NRHP Criteria and the Maritime Visual Setting

The property appears to satisfy NRHP eligibility Criteria A and C due to its association with the development of Martha's Vineyard in the seventeenth and eighteenth centuries. In addition, the house is an extant example of the Cape Cod Style of architecture and one of the oldest surviving houses on the island. The property has a significant maritime setting.

3.4 The Russell Hancock House

3.4.1 Physical Description and Existing Conditions

The Russell Hancock House is a one-and-one-half-story Greek Revival-style house located at 146 Quenames Road. The house features a rectangular footprint with a side ell and rests on a granite foundation. The main block and side ell each have four bays wide with an off-center doorway. The side-gabled roof is clad in asphalt shingles and features two flat-roofed dormers on the main block's façade. An oriel window projects from the east elevation. The main entrance features a wide rectangular wood surround evocative of Greek Revival-style architectural detailing. The property is located on a rise in topography north of Quenames Cove and the Atlantic Ocean (Arcuti and Otteson, 1998b).

3.4.2 Historic Context

The Russell Hancock House was constructed circa 1842. The property's namesake was a local businessman and civic leader who was involved in whaling, farming, and carpentry. He was active in the Chilmark Methodist Church and was listed in the town directories of 1897, 1907, and 1911 as a farmer. His son, Herbert C. Hancock, was born in the house and founded a local contracting business in 1914 (Arcuti and Otteson, 1998b).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The property appears to satisfy NRHP eligibility Criterion C, for being architecturally significant as an extant example of the Greek Revival Style. The property has a significant maritime setting and views to the ocean.

3.5 The Ernest Flanders House, Shop, and Barn

3.5.1 Physical Description and Existing Conditions

The Ernest Flanders House is a c. 1840 one-and-one-half story, side-gabled Cape Cod form house with Federal style details. The main block consists of a five-bay by three-bay arrangement with a rear ell. Windows are six-by-six double-hung sash (Arcuti and Otteson, 1998b). The house rests on an ashlar block foundation of granite. West of the house is the small one-story, side-gabled shop with a door on the north elevation. To the west of the shop sets the larger, two-story barn, with large sliding door on the north elevation and shed-roof garage addition on the east elevation. The buildings are sited in the highlands east of Menemsha Pond.

3.5.2 Historic Context

The house, shop, and barn are associated with Ernest and Allen Flanders, both fishermen. The brothers lived on the property through the earliest years of the twentieth century when Allen Flanders moved to his mother's former home. Ernest Flanders also served as Town Treasurer for Chilmark.

3.5.3 NRHP Criteria and the Maritime Visual Setting

The property, as a whole and inclusive of all three historic buildings, appears to meet NRHP eligibility Criterion A for its representation of the evocative vernacular homes and outbuildings scaled to Martha's Vineyard compressed landscapes and for its association with the distinctive mixed agrarian/maritime economies of Martha's Vineyard and, particularly, the areas bordering Menemsha Pond. The house may also meet Criterion C for its well-preserved Federal Period architectural details, including an elegant doorway and flared window architraves (Arcuti and Otteson, 1998b). The siting of the property on an elevated hillside overlooking Menemsha Pond is important to its historic setting and proximity of the property to the docks of Menemsha Pond was likely a factor in its construction by the Flanders brothers.

3.6 The Simon Mayhew House

3.6.1 Physical Description and Existing Conditions

The Simon Mayhew House is a one-and-a-half-story Cape Cod-style residence located in the neighborhood of Nashaquitsa. The setting consists of open, rolling fields overlooking the ocean. The house contains a side-gabled roof clad in wood shingles in the Federal architectural style. The house has a rectangular plan featuring two side ells and is five bays wide by three bays deep. Fenestration includes twelve-over-twelve double-hung windows, and a bay window projecting from the east elevation. The house sits on a stone foundation with a wood shingle roof and siding and encompasses 15.5 acres. The property has a stone structure, locally known as "The Cromlech," which consists of a series of large stones placed on edge in a semi-circular fashion and capped by a large, flat stone. Local myths associate it with possibly early Norse visitors to North America (Arcuti and Otteson 1998c).

3.6.2 Historic Context

The house was likely constructed circa 1780 by Simon Mayhew, an early settler of Chilmark. Note that this Simon Mayhew is not to be confused with the Simon Mayhew who built the house known as "Flaghole" (Section 3.6). The Simon Mayhew House was possibly built by his son of the same name. The property has been relatively unaltered since its original construction (Arcuti and Otteson, 1998c).

3.6.3 NRHP Criteria and the Maritime Visual Setting

The property appears to satisfy NRHP eligibility Criterion C, for being architecturally significant as an extant example of the late eighteenth century Colonial Cape style. The maritime setting is a character-defining feature of this property. The property has a significant maritime setting and views to the ocean.

3.7 Flaghole – Vincent, James House

3.7.1 Physical Description and Existing Conditions

The Flaghole – Vincent, James House, historically called the Simon Mayhew House, is a one-story Cape Cod-style house located on 13.8 acres in the neighborhood of Nashaquitsa. The setting is rural, and the house is located on a rise on open land that slopes to the ocean. The house is a Colonial-Style house with a side-

gabled roof clad in asphalt shingles and a stone foundation. The house features a smaller one-story addition projecting on the northeast corner. A central chimney rises from the roof ridge. The south-facing façade features a door with a five-pane toplight. Fenestration consists of six-over-six double-hung windows. The house is surrounded by stone walls into which a peat house once was incorporated into the west of the house. The remains of the peat house consist of an uncovered rectangle of stones with a wooden roof and measures approximately 4 or 5 feet high (Arcuti and Otteson, 1998e).

3.7.2 Historic Context

The house was likely constructed circa 1707 by Simon Mayhew, an early settler of Chilmark. Simon's third son, Samuel, inherited the property in 1791, who then left it to two of his sons, John and Jethro. James Mayhew, son of John, inherited the place in 1825. The house was eventually sold to Ethel Blackwell Robinson, who in turn sold it to Dr. Irving and Elizabeth Clark of Worcester in 1938. As of 1998 and the time of the MHC recordation, the house remained in the Clark family. Originally a half house, a "one-quarter" addition was added in the nineteenth century (Arcuti and Otteson, 1998e).

3.7.3 NRHP Criteria and the Maritime Visual Setting

The property appears to satisfy NRHP eligibility Criterion C, for being architecturally significant as an extant example of the Cape Cod Style. The property has a significant maritime setting as it overlooks Squibnocket Pond and may have some views of the Atlantic Ocean from portions of the property.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Hazard Mitigation Plan for Historic Properties

4.1.1 Purpose and Intended Outcome

The Dukes County Multi-Jurisdictional Hazard Mitigation Plan identifies the reduction in the loss of cultural resources, including the four historic properties identified in this HPTP, as a Community (County-wide) Mitigation Goal (MVC, 2021). The intended outcome of this mitigation measure is to provide funding that will assist the Town of Chilmark to "protect and preserve irreplaceable cultural resources" from the threats posed by flooding, storm damage, and fire through the development of a hazard mitigation plan for historic properties (MVC, 2021). The plan may also include an update of the historic properties inventory per the goals of the 2000-2003 Town of Chilmark Master Plan Supplement.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review of existing town and county planning and hazard mitigation documents, guidance. and regulations;
- Review of existing historic properties inventory;
- Photographs and documentation of existing conditions;
- Public engagement to discuss town-wide historic preservation priorities;
- Development of an updated historic property inventory, if required;
- Distribution of the updated historic property inventory to the Participating Parties, if warranted;
- Drafting of a town historic property-specific hazard mitigation plan;
- Distribution of the draft plan to the Participating Parties for review and comment; and
- Development of the final hazard mitigation plan to be distributed the Participating Parties.

4.1.3 Methodology

Revolution Wind will release an RFP for consultant services to perform the Scope of Work listed in Section 4.1.2. The preferred consultants will have experience in developing hazard mitigation plans for historic properties. The consultants will engage the public and Participating Parties to develop a list of prioritized

action items to protect and preserve historic properties. The draft and final plans will be developed in consultation with the Participating Parties.

4.1.4 Standards

The project will comply with following standards:

- The Town of Chilmark Planning Commission guidance, as applicable;
- The Town of Chilmark Community Preservation Commission guidance, as applicable;
- The Town of Chilmark Historical Commission guidance, as applicable;
- Martha's Vineyard Commission planning guidance, as applicable;
- The Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP; and
- Photographs and documentation of existing conditions.
- Draft updated historic property inventory, if required
- Final updated historic property inventory, if required
- Draft hazard mitigation plan; and
- Final hazard mitigation plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30 days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Massachusetts Historic Properties, February 10, 2022.
- Follow-up to the Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of Aquinnah Historic Properties, February 1, 2022 with the Martha's Vineyard Commission, March 18, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

Arcuti, Thomas and H. Otteson. 1998a. *Captain Samuel Hancock-Mitchell, Captain West House*. Massachusetts Historical Commission Inventory Form. Office of the Secretary. Boston, MA.

Arcuti, Thomas and H. Otteson. 1998b. *Russell Hancock House*. Massachusetts Historical Commission Inventory Form. Office of the Secretary. Boston, MA.

Arcuti, Thomas and H. Otteson. 1998c. *Simon Mayhew House*. Massachusetts Historical Commission Inventory Form. Office of the Secretary. Boston, MA.

Arcuti, Thomas and H. Otteson. 1998e. *Simon Mayhew (Flaghole) House*. Massachusetts Historical Commission Inventory Form. Office of the Secretary. Boston, MA.

Burt, Richard L. 2009. *Captain Samuel Hancock-Mitchell, Captain West House*. Massachusetts Historical Commission Inventory Form. Office of the Secretary. Boston, MA.

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ATTACHMENT 16 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE SCRUBBY NECK SCHOOLHOUSE, TOWN OF WEST TISBURY, DUKES COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 16 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Scrubby Neck Schoolhouse

Town of West Tisbury, Dukes County, Massachusetts

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Scrubby Neck Schoolhouse
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Scrubby Neck Schoolhouse, which has been determined by the Massachusetts Historical Commission (MHC) to be eligible for listing on the National Register of Historic Places (NRHP) (the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HREVA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

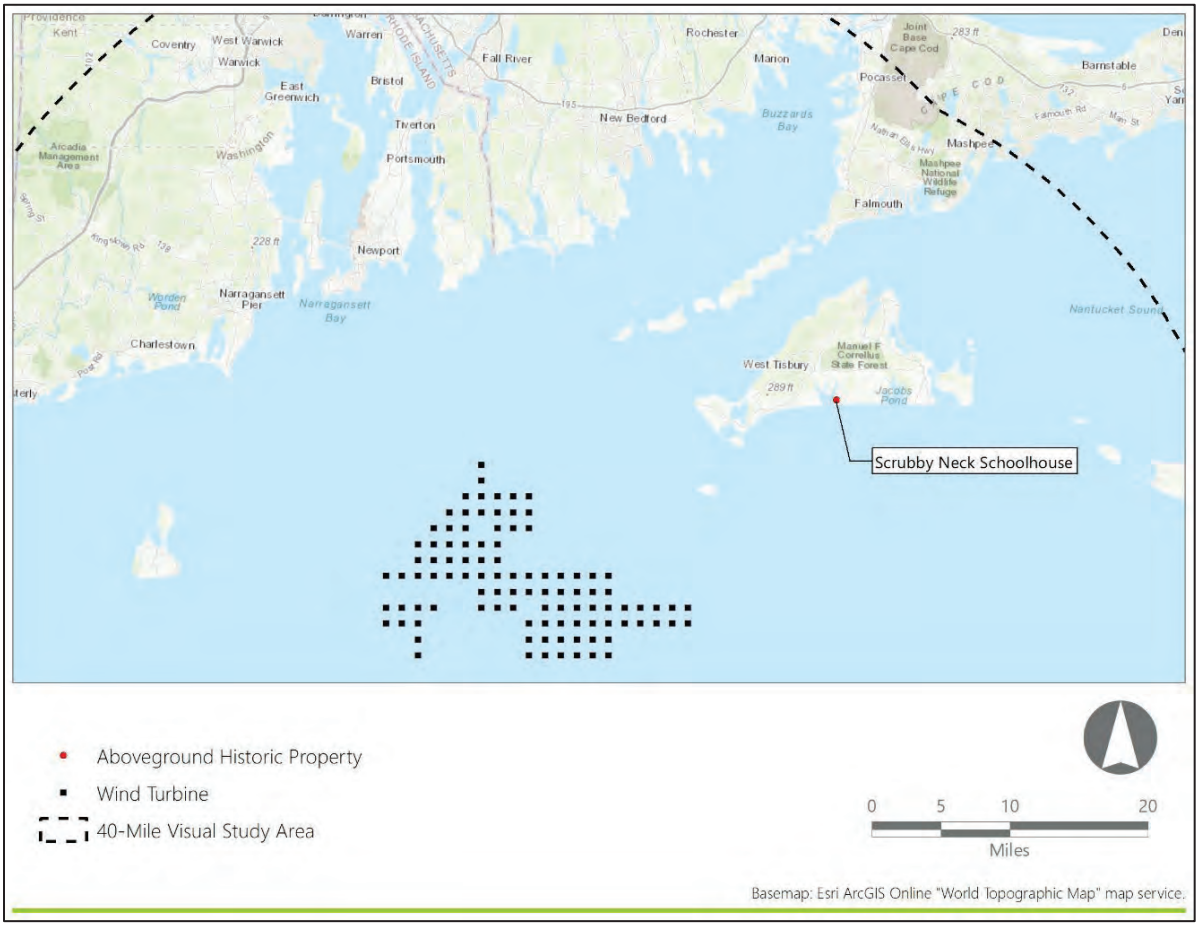
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of West Tisbury
- The Trustees of Reservations
- The Massachusetts Historical Commission.[2]

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

Revolution Wind anticipates the previously listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Property

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
The Scrubby Neck Schoolhouse	MHC Historic Inventory Property	Town of West Tisbury	MA	WTI.170 (MA SHPO)	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The Scrubby Neck Schoolhouse is considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures." Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 The Scrubby Neck Schoolhouse

3.3.1 Physical Description and Existing Conditions

The Scrubby Neck Schoolhouse is a one-room schoolhouse clad in cedar shakes. The building has a simple rectangular plan with two bays of six-over-nine double-hung windows on each long elevation, and a single window of the same construction on the east elevation. An entryway on the west elevation consists of a wood plank door in a simple trim surround. The available photographs depict deteriorated plaster on the interior. The Scrubby Neck Schoolhouse is currently used as a shed for the nearby house at 330 Long Point Road. It is sited on a slight rise on a strip of land that extends between Middle Point Cove and Tisbury Great Pond to the west, and Long Cove to the east. The surrounding landscape consists of a tractor path running to the south, low shrubs and very few trees, and the open waters of the adjacent ponds.

3.3.2 Historic Context

A portion of West Tisbury was subdivided into school districts in 1792. At that time, one-room schoolhouses were typically constructed on less desirable pieces of land. The Scrubby Neck Schoolhouse was built sometime between 1830 and 1850 north of its current site in Scrubby Neck, close to the nineteenth-century center of population (Bouck, 1985). It was moved to its present location at the Long Point Wildlife Refuge at an unknown date prior to the 1951 USGS *Vineyard Haven* map (USGS, 1951).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Scrubby Neck Schoolhouse appears to meet NRHP Criterion C as a one-room schoolhouse built in a vernacular form. The unpainted shingles covering the schoolhouse are a hallmark of vernacular architecture

on Martha's Vineyard, and coastal communities in the region. Adding to its architectural significance is the maritime setting of the property, located on a flat coastal area with visibility of the ocean to the south.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Schoolhouse Conditions Assessment and Feasibility Plan

4.1.1 Purpose and Intended Outcome

The Scrubby Neck Schoolhouse is currently being used as a storage building owned by the Trustees of Reservations. This mitigation measure will fund a conditions assessment and adaptive reuse plan to ensure the long-term use and preservation of the building. The plan will identify and prioritize restoration needs and possible future uses of the building and can be used as a guide for future repairs, cyclical maintenance and other restoration needs.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review the existing conditions of the property;
- Document and photograph the existing conditions;
- Consult with the Participating Parties to determine possible future uses;
- Analyze the local market and feasibility of reuse;
- Draft a Conditions Assessment and Feasibility Plan to be distributed to the Participating Parties for review and comment;
- Develop a final Conditions Assessment and Feasibility Plan, incorporating any comments from the Participating Parties; and
- Distribute the final Conditions Assessment and Feasibility Plan to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the Scope of Work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of historic properties and adaptive reuse plans. The consultant will perform background research and documentation of the existing conditions and will engage with the Participating Parties to determine feasible future uses for the property. A draft of the documents will be provided to the Participating Parties

for review and comment. A final plan will be developed incorporating any comments from the Participating Parties and will be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with following standards:

- The Town of West Tisbury Building Department guidance and regulations, as applicable;
- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68); and
- The National Park Service's *Guidelines for Architectural and Engineering Documentation* (NPS, 2003).

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Photography and documentation (e.g., mapping);
- Preliminary draft of the Conditions Assessment and Feasibility Plan; and
- Final Conditions Assessment and Feasibility Plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Massachusetts Historic Properties, February 10, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 17 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE KAY STREET-CATHERINE STREET-OLD BEACH ROAD HISTORIC DISTRICT/THE HILL, THE OCHRE POINT – CLIFFS HISTORIC DISTRICT, AND THE OCEAN DRIVE HISTORIC DISTRICT NATIONAL HISTORIC LANDMARK, CITY OF NEWPORT, NEWPORT COUNTY, RHODE ISLAND

[Insert ATTACHMENT 17 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Kay Street – Catherine Street-Old Beach Road Historic District/The Hill
The Ochre Point – Cliffs Historic District
The Ocean Drive Historic District, National Historic Landmark
City of Newport, Newport County, Rhode Island

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill, The Ochre Points – Cliffs Historic District The Ocean Drive Historic District, National Historic Landmark
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MOA	Memorandum of Agreement
NHL	National Historic Landmark
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal

ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Kay Street-Catherine Street-Old Beach Road Historic District/The Hill, which is listed on the National Register of Historic Places (NRHP); The Ochre Points – Cliffs Historic District, which is listed on the NRHP; and the Ocean Drive Historic District, a National Historic Landmark, (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

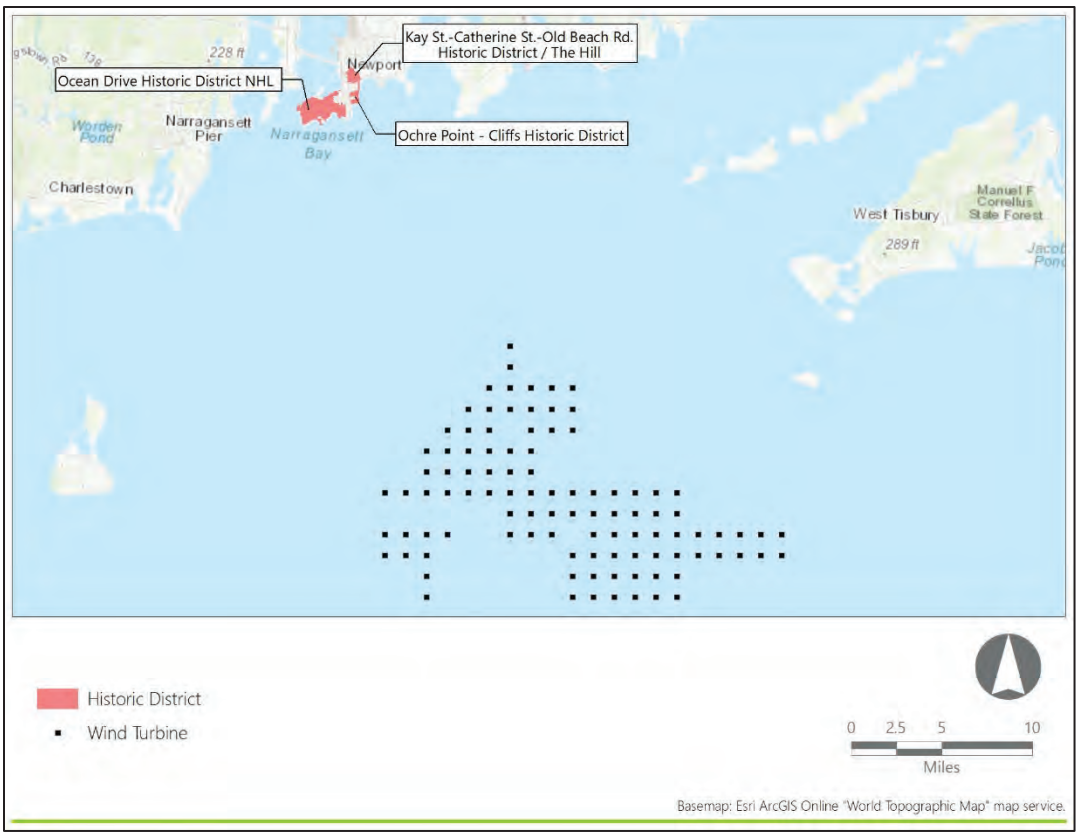
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. The RIHPHC holds preservation easements on the below properties per RI Gen L, Title 42, Section 42-45-9.1 (see Table 2.2.2-1). Any mitigation work will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears below in Section 5.0, Implementation.

Table 2.2.2-1. Restrictions at the Historic Properties

Historic Property Name	Location
Redwood Library	50 Bellevue Avenue
Griswold House (Newport Art Museum)	76 Bellevue Avenue
Cushing Gallery	76 Bellevue Avenue
The Kedge	397 Gibbs Avenue
Harbor Court	5 Halidon Avenue

Historic Property Name	Location
Touro Synagogue National Historic Site	72 Touro Street
Bienvenue	97 Narragansett Avenue
Ochre Court	16 Ochre Point Avenue
The Breakers	44 Ochre Point Avenue
Seaward	49 Cliff Avenue

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The City of Newport
- The Newport Restoration Foundation
- The Newport Historic District Commission
- The Preservation Society of Newport County
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

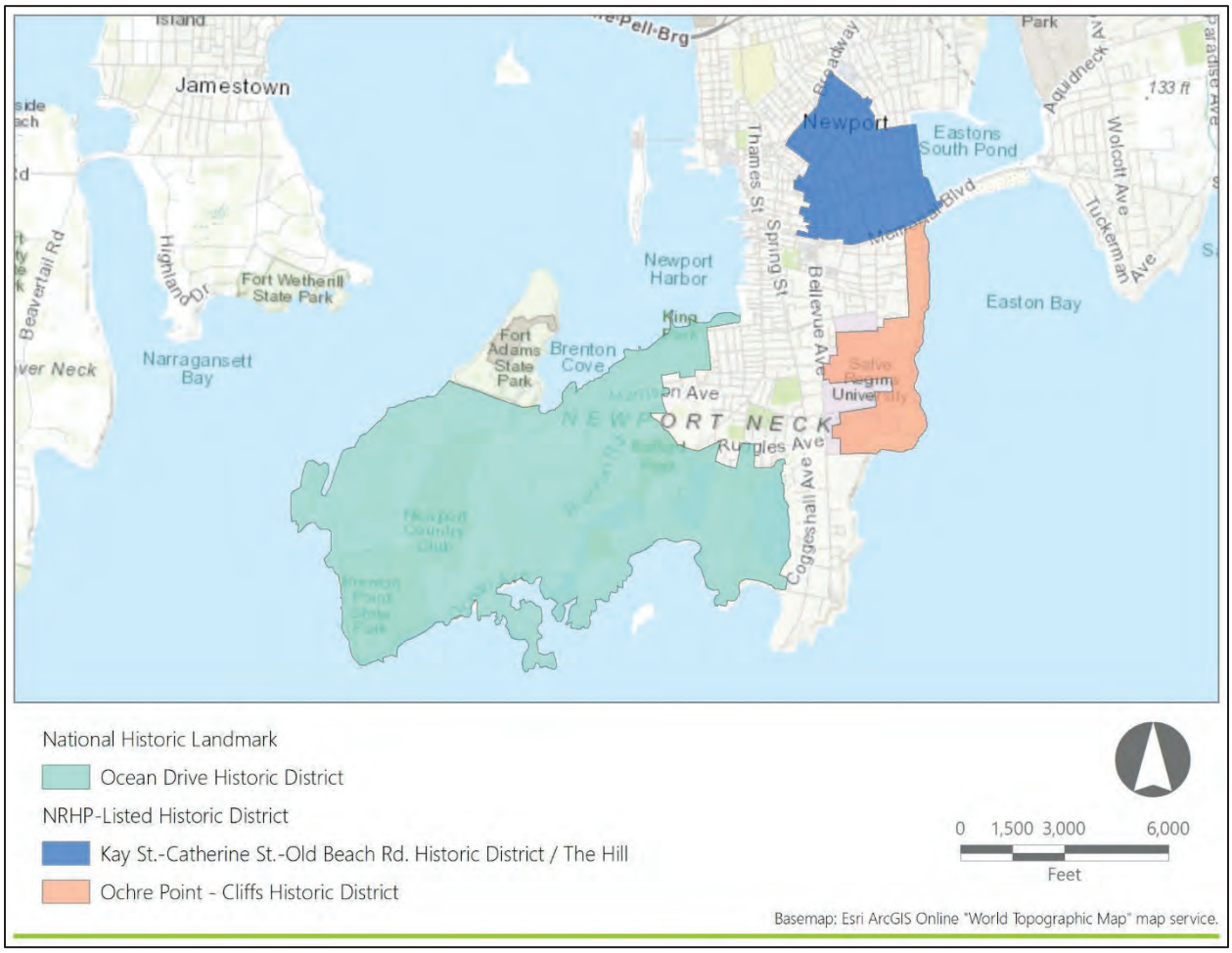
3.1 The Historic Properties

This HPTP involves three historic districts, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type	Historic Property Type
Kay Street-Catherine Street-Old Beach Road Historic District/The Hill	NRHP-Listed	City of Newport	RI	73000052 (NPS)	Public/private	Historic Buildings and Structures	Estates and Estate Complexes
Ochre Point – Cliffs Historic District	NRHP-Listed			75000211 (NPS)		Estates and Estate Complexes	
Ocean Drive Historic District	National Historic Landmark			76000048 (NPS)		Estates and Estate Complexes	

Figure 3.1-1. Historic Property Locations



In Sections 3.3 through 3.5, each resource is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA "Estates and Estate Complexes" and "Historic Buildings and Structures." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris

Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill

3.3.1 Physical Description and Existing Conditions

The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill was listed on the NRHP on May 22, 1973 (Chase, 1973). The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill includes 662 contributing resources in a 245-acre area. The majority of the resources are residential properties

constructed between 1835 and 1945 and vary in architectural style. Institutional buildings, commercial buildings, summer and year-round homes are all located within the district, as well as the Redwood Library, a National Historic Landmark. The district contains buildings designed by some of the most notable American architects of their time, including McKim, Mead & White, Peabody & Stearns, Sturges & Brigham, and Richard Morris Hunt (Chase, 1973).

3.3.2 Historic Context

In the 1840s the community of Newport was becoming a summer destination and inns, hotels, and lodging houses were constructed to meet the needs of the increasing number of tourists. By the mid-nineteenth century, the large summer cottages that Newport is known for were being constructed. This area, known as "The Hill," is located to the east of the commercial center of the city and was an ideal location for some of the first summer houses including Kingscote and the Red Cross Cottage. Commercial buildings and less grand residences were also constructed in the district in the 1850s. According to the NRHP nomination form (Chase, 1973), within the district approximately 75 homes were constructed in the 1870s and 100 buildings were constructed in the 1880s. Starting in the 1890s, more modest homes were being constructed within the district and the trend continued through the 1940s. The contributing properties within the Kay Street-Catherine Street-Old Beach Road Historic District/The Hill decreased from 666 to 129 in 2018 as the result of a boundary decrease that clarified the geographic boundaries of the Kay Street-Catherine Street-Old Beach Road Historic District/The Hill and reduced overlap with the adjacent NHL Newport Historic District (Warbuton, 2018).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Kay Street-Catherine Street-Old Beach Road Historic District/The Hill is significant under Criterion C for its architecture and the role the area played in the development of Newport as a summer tourist destination. The buildings within the district exemplify the district's role as a fashionable summer resort starting in the mid-nineteenth century with the building of the first hotels to the imposing high-style mansions of the Gilded Age.

3.4 The Ochre Point – Cliffs Historic District

3.4.1 Physical Description and Existing Conditions

The Ochre Point – Cliffs Historic District is located in the eastern portion of Newport and is roughly bounded to the north by Memorial Boulevard, to the east by Easton Bay, to the south by Marine Avenue and to the west Bellevue Avenue. Seventy-one contributing resources are identified in the National Register Nomination Form. The Cliff Walk, which is a 3.5-mile, National Recreational Trail, that runs from First/Easton's Beach to Baileys Beach, is also a contributing resource to the Ochre Point – Cliffs Historic District.

3.4.2 Historic Context

Like many coastal New England cities and towns, Newport became a summer resort destination in the mid-nineteenth century. Properties along and adjacent to Bellevue Avenue were chosen as prime locations for some of the wealthiest Americans to build summer cottages due to their locations on the cliff and views to the water. Most of the properties also had designed landscapes surrounding the buildings.

3.4.3 NRHP/NHL Criteria and the Maritime Visual Setting

The Ochre Point – Cliffs Historic District is significant under Criterion A for its contribution to Newport becoming a summer resort and the social history of its summer residents and Criterion C for its architecture and designed landscapes.

As stated above, contributing resources of the Ochre Point – Cliffs Historic District were constructed on or nearby Bellevue Avenue to take advantage of the views of Easton Bay and the Atlantic Ocean. The landscapes surrounding many of the properties were also designed to take advantage of the views. The Cliff Walk features expansive views of the Atlantic Ocean, which are integral to the visual and maritime setting of the trail.

3.5 The Ocean Drive Historic District, National Historic Landmark

3.5.1 Physical Description and Existing Conditions

The Ocean Drive Historic District is both listed on the NRHP and was designated as an NHL district on May 11, 1976 (Longstreth, 1976; Pitts, 1976). The Ocean Drive Historic District is made up of 45 contributing properties located in a 1,509-acre suburban/rural setting encompassing most of the Newport Neck peninsula southwest of the City of Newport, Rhode Island. The summer homes in this district feature great variety in style and opulence, ranging from Neoclassical-style residences to early nineteenth-century farms. The coastline features promontories and jetty-like rock formations.

3.5.2 Historic Context

The first European to occupy Newport Neck was William Brenton, who was an important founding figure in the history of Newport. Brenton and his descendants worked to develop the landscape for agriculture, erected the first buildings, and cut trails for the frequent visitors to the land. The area became a seasonal retreat for the wealthy even prior to the Revolutionary War. After being destroyed by the British during the Revolutionary War, Newport Neck remained rural for decades. By the mid-nineteenth century the community in Newport and along Bellevue Avenue to the north and east of the present-day Ocean Drive Historic District grew and the elite citizens utilized Newport Neck for daytime excursions to enjoy the pastoral setting. By the turn of the twentieth century, overland transportation had improved, and the building of large estates began. Landscape development was carried out by the well-known landscape architect Frederick Law Olmsted and his firm. In the late twentieth century, several of the large estate houses were demolished, but the rural character of the district was cultivated and maintained (Longstreth, 1976).

3.5.3 NRHP/NHL Criteria and the Maritime Visual Setting

The summer homes in the Ocean Drive Historic District feature great variety in style and opulence, ranging from Neoclassical-style mansions to early nineteenth-century farms. In contrast to the adjacent Bellevue Avenue Historic District, however, Ocean Drive (aka Ocean Avenue) is decidedly more bucolic and rural, with greater expanses between structures accentuated by natural and designed landscapes. The national significance of the Ocean Drive Historic District is derived from its architecture, which includes works from McKim, Mead and White, John Russell Pope, and landscape architecture by Frederick Law Olmstead (Pitts, 1976). In 2012 an updated statement of significance was appended to the NHL nomination which elaborated and expanded upon the initial areas of Criterion C significance such as architecture and landscape design. The update also addressed additional Criterion A areas of significance such as planning, and engineering related to maritime views and design features purposefully built to interact with the shoreline and the ocean. The updated nomination materials also included a detailed account of the evolution of Ocean Drive as a "pleasure drive" to accompany the development of the inland areas as an upper-income resort suburb. In addition, the landscape architecture firm of Frederick Law Olmstead was involved in at least two subdivisions and 15 private contract designs within the district. These designs include properties situated on dramatic overlooks, and along Ocean Drive (Reed, 2012). Clearly this roadway was specifically constructed to take advantage of ocean views.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected, and the heightened significance and standard of care for the NHL. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Property Owner Guidebook

4.1.1 Purpose and Intended Outcome

The 2017 *City of Newport's Comprehensive Land Use Plan* states "Newport's historic, architectural, and maritime resources are the City's greatest assets in shaping a vision for the future" (Matrix Design Group, 2017). In addition, the *City of Newport, Rhode Island Natural Hazard Mitigation Plan* "calls for the development and implementation of a plan to protect historic structures" (City of Newport, 2016.) The purpose of this mitigation measure is to provide funding for the development of a historic property owner guidebook per the goal "to identify, protect, and enhance the City's cultural and historical resources" identified in the comprehensive plan (Matrix Design Group, 2017).

The guidebook will update the existing *Standards and Guidelines for the Newport Local Historic District* which was revised in 2016 with a focus on climate change, resiliency planning, and energy efficiency in historic buildings. This guidebook will provide easy to understand guidance using both text and illustrations to increase public awareness and knowledge regarding best practices for historic properties.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review the existing guidelines, laws, regulations, city plans, building code and other applicable sources;
- Review and understand best practices in climate change, resiliency planning, and energy efficiency in historic buildings;
- Consult with the Participating Parties and the public to develop an understanding of the needs of the community;
- Develop a draft guidebook incorporating the concerns of the public and Participating Parties;
- Distribute the draft guidebook to the Participating Parties for review and comment; and
- Produce a final guidebook for the owners of historic properties to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of climate change and the treatment of historic properties. Public engagement sessions to inform the public on the intersection of climate change, resiliency planning, energy efficiency, and historic preservation. A draft set of guidelines will be prepared incorporating the comments from the public and Participating Parties. The draft guidebook to the Participating Parties for review and comment. The comments will be incorporated into the production of a final guidebook for the owners of historic properties to be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with the following standards:

- The Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties (36 CFR 68);
- The National Park Service's *Creating and Using Design Guidelines;*
- The 2017 *City of Newport's Comprehensive Land Use Plan*;
- The *City of Newport, Rhode Island Natural Hazard Mitigation Plan;*
- The City of Newport Building, Zoning, and Inspections; and
- The City of Newport Historic District Commission.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Consultant bids in response to RFPs;
- Draft Historic Property Owner Guidebook; and
- Final Historic Property Owner Guidebook.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Stormwater Drainage Improvement Plans for the Historic Districts

4.2.1 Purpose and Intended Outcome

One of the goals identified in the 2017 *City of Newport's Comprehensive Land Use Plan* is to "provide a comprehensive, City-wide stormwater plan and implementation strategy to protect public safety and property" (Matrix Design Group, 2017). One of the policies in the plan is to "implement innovative measures, such as Green Infrastructure, to manage storm water" (Matrix Design Group, 2017).

This HPTP proposes the completion of plans to improve overall stormwater drainage for the historic districts and create areas of permeable surfaces to decrease the likelihood of flooding occurring in and around historic properties. The intended outcome is to provide funding to the City of Newport to create conceptual plans to improve stormwater drainage within the historic districts, similar to the Hillside Avenue Green Infrastructure project (City of Newport Utilities Department Stormwater Projects, 2018). The plans may include green parking lots, streets and sidewalks, permeable pavement, biosawles, rain gardens, blue and green roofs, among other green infrastructure solutions (NRDC, 2019).

4.2.2 Scope of Work

The scope of work will consist of the following:

- Review the current stormwater management plans;
- Review the city's applicable guidance and regulations;
- Document existing conditions including mapping and photography;
- Consult with the Participating Parties;
- Review and understand best practices in green infrastructure and stormwater management;
- Identify areas of improvement within the existing plans;
- Develop a draft plan in consultation with Participating Parties;
- Distribute the draft plan to the Participating Parties for review and comment; and

- Develop a final plan which incorporates any comments received and the distribution of the plan to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.2.2. The preferred consultant would be a qualified civil engineer with a demonstrated experience in modern concepts of stormwater management in a coastal context and preferably a demonstrated competence in historic preservation practices and the Secretary of the Interior's Standards for the Treatment of Historic Properties. The consultant will conduct a comprehensive review of existing storm water features and the existing condition of the current plan and infrastructure. The consultant will meet with the Participating Parties to determine the current status and needs of the city. A draft plan will be developed and distributed to the Participating Parties for review and comment. The final plan will incorporate any comments and will be provided to the Participating Parties.

4.2.4 Standards

The project will comply with following standards:

- The U.S. Environmental Protection Agency guidance and regulations, as applicable;
- The Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties (36 CFR 68);
- The National Park Service's *Creating and Using Design Guidelines;*
- The 2017 *City of Newport's Comprehensive Land Use Plan*;
- The *City of Newport, Rhode Island Natural Hazard Mitigation Plan;*
- The City of Newport Department of Utilities guidance and regulations, as applicable;
- The City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable;
- The City of Newport Historic District Commission guidance and regulations, as applicable; and
- The City of Newport Department of Planning & Economic Development guidance and regulations, as applicable The City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Photography and documentation of existing conditions;
- Preliminary stormwater management plan; and
- Final stormwater management plan.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Newport Historic Properties, January 25, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 18 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE BELLEVUE AVENUE HISTORIC DISTRICT, ROSECLIFF, THE BEAKERS, AND THE MARBLE HOUSE, CITY OF NEWPORT, NEWPORT COUNTY, RHODE ISLAND

[Insert ATTACHMENT 18 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Bellevue Avenue Historic District
Rosecliff
The Breakers
The Marble House
City of Newport, Newport County, Rhode Island

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:



Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:



Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Bellevue Avenue Historic District, National Historic Landmark Rosecliff The Breakers, National Historic Landmark The Marble House, National Historic Landmark
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft, applicant-proposed Historic Property Treatment Plan (HPTP) for the Bellevue Avenue Historic District, a National Historic Landmark; Rosecliff, which is listed on the National Register of Historic Places (NRHP); the Breakers, a National Historic Landmark; and the Marble House, a National Historic Landmark (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
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- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
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- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

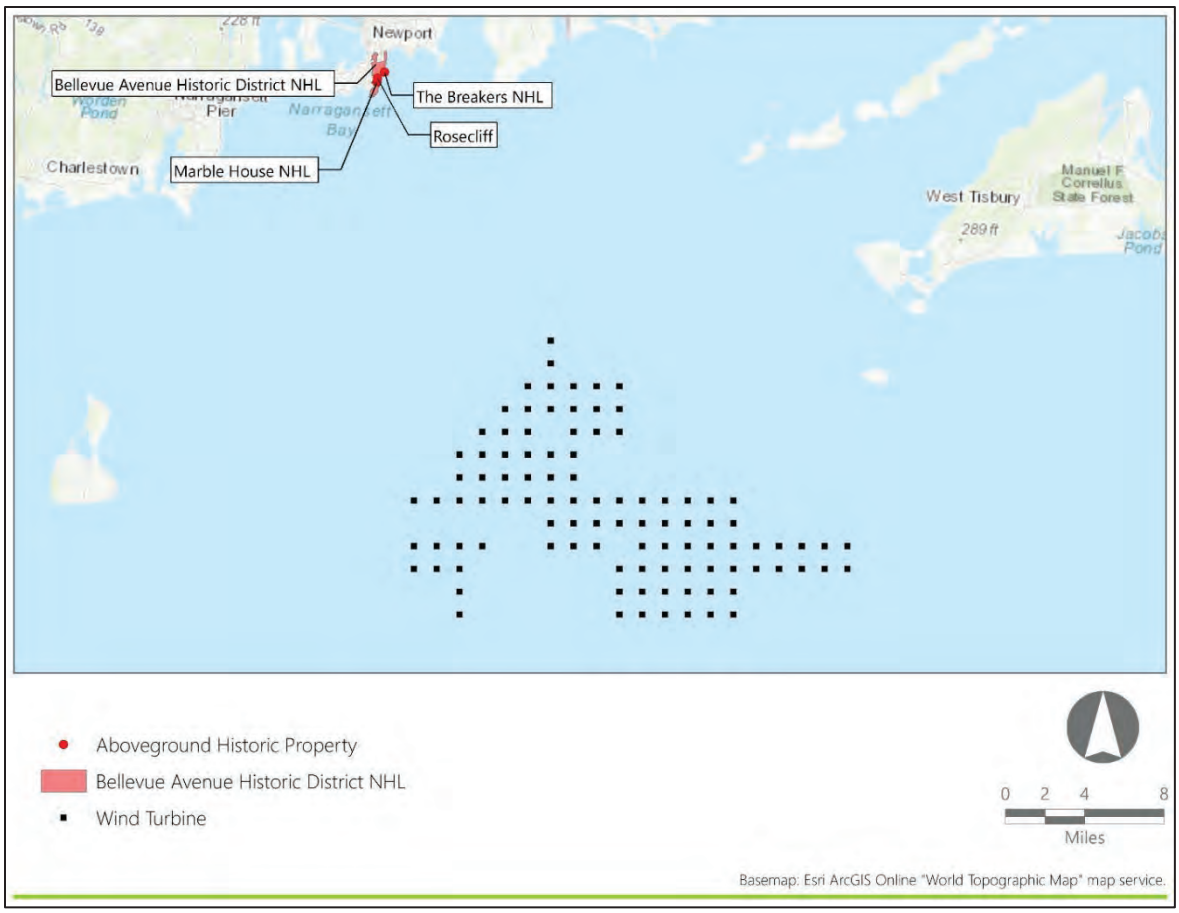
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. The RIHPHC holds preservation easements on the below properties per RI Gen L, Title 42, Section 42-45-9.1 (see Table 2.2.2-1). Any mitigation work will comply with the conditions of all extant historic preservation easements. Additional information regarding compliance with extant preservation restrictions appears below in Section 5.0, Implementation.

Table 2.2.2-1. Restrictions at the Historic Properties

Historic Property Name	Location
Newport Casino	186-202 Bellevue Avenue
Kingscote	253 Bellevue Avenue
Chateau-sur-Mer	424 Bellevue Avenue
Chinese Tea House at Marble House	596 Bellevue Avenue

Seaward	49 Cliff Avenue
Faxon Lodge	28 Gammell Road
Edward King House	35 King Street
Bienvue	97 Narragansett Avenue
Ochre Court	16 Ochre Point Avenue
The Breakers	44 Ochre Point Avenue

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following:

- The City of Newport
- The Newport Restoration Foundation
- The Newport Historic District Commission
- The Preservation Society of Newport County
- The Rhode Island Historical Preservation & Heritage Commission

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

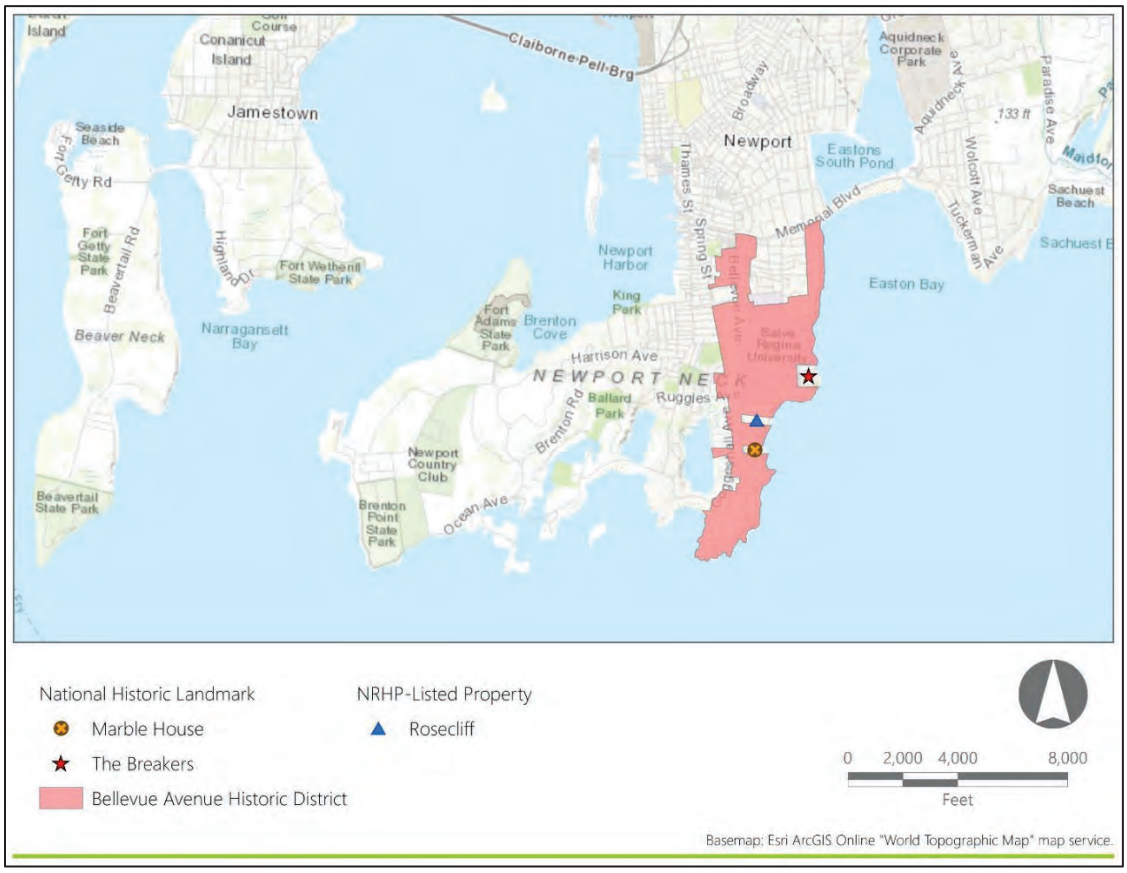
3.1 Historic Properties

This HPTP involves four historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Bellevue Avenue Historic District	National Historic Landmark	Newport	RI	NRIS ID: 72000023	Private	Estates and Estate Complexes
Rosecliff	NRHP-Listed			NRIS ID: 73000059	Preservation Society of Newport County	
The Breakers	National Historic Landmark			NRIS ID: 71000019		
Marble House	National Historic Landmark			NRIS ID: 71000025		

Figure 3.1-1. Historic Property Location



In Sections 3.3 through 3.6, the historic properties are described both physically and within their historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included in the property type defined in the HRVEA as "Estates and Estate Complexes," and consist of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the area as it became a prominent vacation and recreation area for the emerging American elite.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

3.3 Bellevue Avenue Historic District National Historic Landmark

3.3.1 Physical Description and Existing Conditions

The Bellevue Avenue Historic District National Historic Landmark is approximately two miles long and consists of 87 contributing properties in a 606-acre district occupying several blocks along Bellevue Avenue, from Memorial Boulevard in the north, to Block Island Sound in the south, in the City of Newport. Spring Street and Cogshell Avenue form the western boundary of the district, while Narragansett Bay forms the eastern boundary. From north to south, this district features two miles of commercial blocks and villas, notably ending in the south with the grand and palatial nineteenth-century estates of wealthy summer residents.

The Cliff Walk is a contributing resource to the Ochre Point-Cliffs Historic District, which is part of the Bellevue Avenue Historic District, and designated a National Recreational Trail. The Cliff Walk extends approximately 3.5 miles along the eastern coastline of Aquidneck Island and the Bellevue Avenue Historic District, situated on the rocky outcrops of the shore and featuring expansive views of Easton Bay and the Atlantic Ocean. The Cliff Walk is part of the typical experience for visitors to the Newport mansions, is open to the public, and has been described as "Rhode Island's #1 tourist destination" with (reportedly) over 1.2 million visitors per year (Winthrop, 2021). Portions of the Cliff Walk were washed away in Hurricane Sandy and were recently restored/rebuilt with grant funds from the RIHPHC and National Park Service (RIHPHC, 2019).

3.3.2 Historic Context

During its early decades and up to the mid-nineteenth century, Newport primarily grew around the downtown area to the north of Bellevue Avenue. The notable historic properties within the National Historic Landmark district were built during the Gilded Age, when some of the wealthiest Americans engaged in massive high-style residences for use as summer homes. Many of the estates in this district were designed by world-renowned master architects, including Richard Upjohn, Richard Morris Hunt, and McKim, Mead, and White. The district possesses many distinctive examples of high-style architecture. The district was listed as a National Historic Landmark on May 11, 1976.

3.3.3 NRHP/NHL Criteria and the Maritime Visual Setting

The significance by which the district was originally listed is primarily focused on architecture, commerce, and landscape architecture. While the significance attributed to the district does not explicitly reference the ocean, the estates were sited to take advantage of the ocean views. For example, property names such as "Sea View Terrace" and "Ocean View" imply that maritime views are essential to the district's identity. In addition, the NRHP nomination form for the Ochre Point-Cliffs Historic District (a contributing property to the Bellevue Avenue Historic District NHL), contains the following reference:

> *[The Ochre Point-Cliffs Historic District] has a fine, elevated north-easterly view over the lower, Easton's Beach, part of Newport, and, easterly out past Middletown's hill and on towards Sakonnet, Westport and Cape Cod, far out into the Atlantic horizon. This high, grassed promontory had its obviously desirable features even though Bellevue Avenue was the first fashionable allee* (Harrington, 1974).

A major focus of the Ochre Point-Cliffs Historic District portion of the Bellevue Avenue Historic District is the Cliff Walk. The Cliff Walk was designed specifically to afford maritime views, as illustrated in the following excerpt from the nomination document:

> *The [Cliff]Walk provides spectacular views at every point, as it winds near many mansions and occasionally dips down to the shore. Originally a fishermen's trail, the Cliff Walk was at one time the subject of a court battle between the owners of the estates bordering the walk-way and the public. The estate-owners wished to prevent public access and viewing across their properties and erected gates and other barriers to close the Walk and prevent such nuisance. Such action outraged the native Newporters, who went to court and won a decision which re-asserted the right of the public to an unobstructed foot-way around the island. Thus, the barriers were removed, and the present foot-path was laid out, with much use ever since, with maintenance undertaken first by the Works Progress Administration in the 1930's-1940's, and by the municipality in more recent years* (Harrington, 1974).

3.4 Rosecliff

3.4.1 Physical Description and Existing Conditions

Rosecliff, also known as the Hermann Oelrichs House and the J. Edgar Monroe House, is located at 548 Bellevue Avenue in Newport. The building was designed by McKim, Mead & White for Mrs. Hermann Oerlichs and was completed in 1902. Rosecliff is located on the east side of Bellevue Avenue overlooking Sheep Point Cove and the Atlantic Ocean. The house was designed by Stanford White and modeled after the Grand Trianon in Versailles in the neo-classical style as a summer home for the Oerlichs family (Harrington, 1972). The building features a basic H-shaped form and is constructed in brick clad in white terracotta. The elaborate festooning and details underscore the grandeur of its massing. The landscape is an excellent example of a manicured Gilded Age lawn, and features highly stylized steps, statuary, and a fountain.

3.4.2 Historic Context

Theresa Fair Oelrichs was a wealthy silver heiress and became a member of a "triumvirate" of wealthy women who managed large mansions in Newport. In service of the formal expectations of the day, Rosecliff was constructed in 1902 primarily for socializing and entertaining among the wealthy and elite of the turn of the twentieth century. The property was in the Oerlichs family until 1941, when it was sold to Mr. and Mrs. Edgar Monroe. The Monroe family donated the property to the Preservation Society of Newport County in 1971. Since that time, Rosecliff has played a prominent role in the local preservation movement.

3.4.3 NRHP/NHL Criteria and the Maritime Visual Setting

The original NRHP documentation indicates that the property was listed due to its architectural significance (Harrington, 1972). However, as with the other grand homes in Newport built during the Gilded Age, Rosecliff is situated on a large, manicured lot, with the main entrance facing Bellevue Avenue and the rear of the house and back yard situated to afford ocean views.

3.5 The Breakers National Historic Landmark

3.5.1 Physical Description and Existing Conditions

The Breakers National Historic Landmark, also known as the Cornelius Vanderbilt II House, is located at 44 Ochre Point Avenue. It emulates a sixteenth-century, northern Italian palazzo. The architecture features elaborate façade work and imposing mass and speak to the substantial power and wealth of the original residents. The building is three stories high and overlooks the ocean to the east. The building is characterized by an imposing mass and scale, complimented by elaborate Neoclassical ornamentation, set within a designed landscape context to focus attention to the exterior of the residence when viewed from the lawn.

3.5.2 Historic Context

The Breakers estate was designed by Richard Morris Hunt and built between 1893 and 1895 for Cornelius Vanderbilt II. As the preeminent "summer cottage" among the Newport mansions, the Breakers symbolized the accumulation of massive wealth by the Vanderbilts during the Gilded Age. The property was first leased by the Preservation Society of Newport County in 1948, which later purchased the property in 1972. The descendants of the original owners still occupy the third floor.

3.5.3 NRHP/NHL Criteria and the Maritime Visual Setting

The estate is nationally significant for its historic associations with America's first architect trained at the Ecole Des Beaux-Arts, Richard Morris Hunt, and for being the largest and perhaps most famous Newport estate built by a wealthy patron, Cornelius Vanderbilt II, at the turn of the twentieth century (Harrington, 1971; Tschirch, 2005). The Breakers was individually listed in the NRHP in 1971 and designated an NHL in 1994. The discussion in the NRHP and NHL documentation focuses on specific elements of building and landscape architecture within the boundary of the Breakers' property. While the elements themselves may

have been constructed, oriented or designed to engage with views toward the ocean, there is no explicit reference in the nomination to the consideration of maritime views. However, the main building is oriented to face south-east across the open sloping lawn toward the sea. In addition, the Cliff Walk passes through/adjacent to the property along the shoreline, although it is not a contributing resource to the NHL property.

3.6 Marble House National Historic Landmark

3.6.1 Physical Description and Existing Conditions

The Marble House National Historic Landmark is a three-story Beaux Arts-style mansion located at 596 Bellevue Avenue in Newport, Rhode Island. The building features a two-story Corinthian portico, a balustrade along the roof line, and other examples of rich architectural flourishes evocative of the Gilded Age Newport mansions. A U-shaped driveway leads from Bellevue Avenue to the front portico. The building is set within a manicured landscape with an Orientalist "Chinese Teahouse" overlooking Sheep's Cove accessed by a meandering trail.

3.6.2 Historic Context

The Marble House was constructed for William Vanderbilt and designed by famed architect Richard Morris Hunt in 1892. Built with an imposing architectural scale and clad in Tuckahoe white marble, it is one of the stateliest mansions within the Bellevue Avenue Historic District. The property was individually listed on the NRHP in 1972. It was individually listed as a National Historic Landmark in 2006.

3.6.3 NRHP/NHL Criteria and the Maritime Visual Setting

The NHL nomination describes Marble House as "a temple on a landscape atop the cliff of Newport overlooking the Atlantic Ocean" and emphasizes the property's position atop a thirty-foot cliff and the "Chinese Teahouse" perched atop the cliff (Tschirch, 2005). The property, main structure, and Teahouse are sited to afford open views of the ocean views. The Cliff Walk passes through/adjacent to the eastern boundary of the property.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior (SOI) Qualifications Standards for History, Architectural History and/or Architecture (62 FR 33708) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected, and the heightened significance and standard of care for the NHL. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 National Register of Historic Places Nomination for the Cliff Walk

4.1.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to officially document the history and significance of the Cliff Walk as an individual historic property, which is located within the boundaries of the Bellevue Avenue Historic District. The Cliff Walk is a 3.5-mile, National Recreational Trail, which runs from First/Easton's Beach to Baileys Beach. The Cliff Walk is a public trail that features expansive views of the Atlantic Ocean, which are integral to the visual setting and visitor experience for this significant site. The trail also provides visitors views of some of the most prominent historic properties in Newport, including the Breakers, National Historic Landmark, Rosecliff, and Marble House, National Historic Landmark.

Listing properties on the NRHP not only documents the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Research of available historic sources and existing documentation;
- Field survey, annotated photographs, mapping, and conditions assessments;
- Drafting of a NRHP Nomination Form to be distributed to the Participating Parties for review and comment;
- Development of a final amendment NHL Form which addresses comments from the Participating Parties;
- Distribution of the final NRHP Nomination Form to the Participating Parties; and

- Presentation of the final NRHP Nomination Form to the State Historic Preservation Office Review Board.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant selected will prepare a draft NRHP Nomination Form, prepared in accordance with applicable National Park Service and RIHPHC guidance. The draft document will include a description of the boundaries and property, a historic context and statement of significance, and all maps and photographs required by National Park Service (NPS) guidance. The draft NRHP Nomination Form will be distributed to the Participating Parties for review and comment. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties. The final document will be presented to the Rhode Island State Historic Preservation Office Review Board.

4.1.4 Standards

The project will comply with the following standards:

- The City of Newport Historic District Commission standards;
- The City of Newport Historic District Zoning, Chapter 17.80;
- The *Secretary of the Interior's Guidance on the Identification of Historic Properties* (36 CFR 800.4);
- The *Secretary of the Interior's Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture* (62 FR 33708);
- National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*;
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Support the Development of a Resiliency Plan for the Cliff Walk

4.2.1 Purpose and Intended Outcome

Climate change, freeze and thaw cycles, winds, rains and other weather-related events have caused the deterioration and even the collapse of sections of the Cliff Walk in recent years. The purpose of this mitigation measure is to provide funding to support the City of Newport's existing initiative to prepare a Resiliency Plan (or similar) to develop measures that can be taken to maintain the setting and character of the Cliff Walk and ensure its long-term preservation. The plan will prioritize repairs and identify long-term resiliency solutions to protect the Cliff Walk for future generations of visitors.

The Cliff Walk extends approximately 3.5 miles along the eastern coastline of Aquidneck Island and the Bellevue Avenue Historic District, situated on the rocky outcrops of the shore and featuring expansive views of Easton Bay and the Atlantic Ocean (City of Newport, 2016). The Cliff Walk is part of the typical experience for visitors to the Newport mansions, is open to the public, and has been described as "Rhode Island's #1 tourist destination" with (reportedly) over 1.2 million visitors per year (Winthrop, 2021).

Portions of the Cliff Walk were washed away in Hurricane Sandy and were recently restored/rebuilt with grant funds from the RIHPHC and National Park Service (City of Newport, 2016; RIHPHC, 2019). More recently, on March 4, 2022, an approximately 20-foot section of the Cliff Walk collapsed, presumably due to ongoing erosion (Cozzolino, 2022; Dunning, 2022). Revolution Wind is aware that the City of Newport is actively working to prepare a "Cliff Walk Management Plan" (or similar), which is intended as a guide for best practices for operation and maintenance of this important community asset to respond to the threats posed by climate change (Dunning, 2022). The mitigation funding proposed by Revolution Wind is intended to support the City in their efforts to plan for the rehabilitation and preservation of this significant historic and recreational property.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Documentation of existing conditions, including mapping and photography;
- Research of available historic, scientific, and engineering sources and documentation;
- Research of current knowledge and scientific data related to coastal erosion resulting from climate change, including previous studies of shoreline change and the mechanisms of bluff erosion that have affected the Cliff Walk and may pose risks to long term preservation efforts;
- Consultation with the public and Participating Parties to identify priorities and concerns;
- Preparation of a draft Resiliency Plan, to be distributed to the Participating Parties for review and comment;
- Development of a final plan incorporating any comments received; and
- Distribution of the final plan to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release an RFP for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.2.2. Research on current environmental science, potential near-term and long-term threats to the property, relevant literature pertaining to historic preservation planning and climate change, and engineering solutions/physical improvements will be incorporated by the consultant into a Resiliency Plan. The draft plan will be developed in coordination with the public and Participating Parties to identify and prioritize short-term and long-term measures to enhance preservation outcomes based on reasonable forecasting of future environmental and climate conditions. The plan will then be distributed to the Participating Parties for review and comment. The final plan will incorporate any comments received and will be distributed to the Participating Parties.

4.2.4 Standards

The project will comply with the following standards:

- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The 2017 *City of Newport's Comprehensive Land Use Plan*;
- The *City of Newport, Rhode Island Natural Hazard Mitigation Plan;*
- The City of Newport Department of Utilities guidance and regulations, as applicable;
- The City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable;
- The City of Newport Historic District Commission guidance and regulations, as applicable; and
- The City of Newport Building, Zoning, and Inspections guidance and regulations, as applicable.

4.2.5 Documentation

Proposed scopes of work, draft text, project plans and design specifications are to be provided for review by the Participating Parties.

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft of the Resiliency Plan; and
- Final revised Resiliency Plan.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Support On-Going Maintenance and Aesthetic Improvements to the Cliff Walk

4.3.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to provide funding for the implementation of resiliency measures, on-going maintenance, and/or aesthetic improvements to the Cliff Walk to ensure the long-term preservation of this historic resource. As described above in Section 4.2.1, Revolution Wind is aware that the City of Newport is actively working to prepare a Cliff Walk Management Plan, which is intended as a guide for best practices for operation and maintenance of this important community asset to respond to the threats posed by climate change (Dunning, 2022). The mitigation funding proposed by Revolution Wind is intended to support the City in their efforts to implement resiliency and maintenance measures to ensure the long-term preservation of this significant historic and recreational property.

4.3.2 Scope of Work

The scope of work will be determined in consultation with the Participating Parties but may include:

- Support ongoing maintenance of the Cliff Walk;
- Funds to support aesthetic improvements;
- Funds to support necessary rehabilitation to improve resiliency to storm events; and/or
- Funds to support expanded public interpretation of the Cliff Walk and risks/challenges posed by climate change.

4.3.3 Methodology

Revolution Wind will complete this scope using professionals currently involved in this work or hire additional specialists as required in consultation with the Participating Parties.

4.3.4 Standards

The project will comply with the following standards:

- The Newport Cliff Walk Commission;
- The City of Newport Building, Zoning, and Inspections;
- The City of Newport Historic District Commission; and
- The Secretary of the Interior's Standards for Treatment of Historic Properties (36 CFR 68).

4.3.5 Documentation

The documentation will be determined in consultation with the Participating Parties.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.4 Development of an Invasive Species Management Plan

4.4.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to provide an invasive species vegetation management plan for the historic properties of the City of Newport, with a focus on management of invasive species that threaten the historic character and ecology of the Cliff Walk and the historic properties identified in this HPTP. The intended outcome is to produce a guide for property owners to identify native and invasive species, their threats to historic building materials, historic character, and/or human health, and recommendations for the proper management of each species. Management of invasive species will improve the character and contribute to maintaining the integrity of the visual setting for these historic properties.

4.4.2 Scope of Work

The scope of work will consist of the following:

- Documentation of existing conditions and identification of current invasive species;
- Research of available historic, scientific, and horticultural sources and documentation;
- Research of current best practices relevant to historic gardening and modern horticulture;
- Consultation with the Participating Parties;
- Development of a draft Vegetation Management Plan to be distributed to the Participating Parties for review and comment; and
- A final plan to be distributed to the Participating Parties.

4.4.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.4.2. The consultant will identify, document, and research the existing invasive species in the area as well as available historic, scientific, and horticultural sources and documentation and best practices relevant to historic gardening and modern horticulture. The consultant will consult with the public and Participating Parties to identify concerns and priorities and develop a draft plan to be distributed for review and comment. The final plan will incorporate comments received and will be distributed to the Participating Parties.

4.4.4 Standards

The project will comply with the following standards:

- *Preservation Brief #36: Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes* (Birnbaum, 1994);
- The Alliance for Historic Landscape Preservation guidance, as applicable;
- The City of Newport Historic District Commission guidance and regulations, as applicable;
- The City of Newport Department of Planning & Economic Development guidance and regulations, as applicable; and
- The Secretary of the Interior's Standards for Treatment of Historic Properties (36 CFR 68).

4.4.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP.
- Draft Vegetation Management Plan; and
- Final Vegetation Management Plan.

4.4.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.5 Volunteer Ambassador Program

4.5.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to assist the Newport Cliff Walk Commission with the development of the Volunteer Ambassador Program as part of the Cliff Walk Together campaign which was launched in May 2021 (Winthrop, 2021). The program will help with the on-going maintenance and public appreciation of the Cliff Walk, which will help to ensure the long-term preservation of this property.

4.5.2 Scope of Work

The scope of work will consist of:

- Engaging with the Participating Parties to determine the program's needs;
- Developing list of program needs; and
- Providing support to the identified needs.

4.5.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.5.2. The preferred consultant should

have demonstrated volunteer engagement and management experience to perform the scope of work. The exact scope of work will be determined in consultation with the Participating Parties.

4.5.4 Standards

The project will comply with the following standards:

- *Preservation Brief #36: Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes,* as applicable (Birnbaum, 1994);
- The Alliance for Historic Landscape Preservation guidance, as applicable;
- The City of Newport Historic District Commission guidance and regulations, as applicable;
- The City of Newport Department of Planning & Economic Development guidance and regulations, as applicable; and
- The Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties (36 CFR 68).

4.5.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Identified program needs; and
- Program support plan.

4.5.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.6 Mobile Application

4.6.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to undertake upgrades or additional content for the existing Cliff Walk mobile application[2], developed by the City of Newport in 2015, or to create a new mobile app for the Cliff Walk as determined in consultation with the Participating Parties. The intended outcome is to enhance the features and functionality of the mobile app by integrating artificial intelligence (AI) and/or historic photographs through QR codes or geolocations to show views of the changes over time both toward the land and the ocean and/or by adding additional locations/views as requested by Participating Parties.

[2] The Cliff Walk app: https://citimaps.com/events/newport-ri-sights-and-attraction/cliff-walk/

4.6.2 Scope of Work

The scope of work will consist of the following:

- Examination of the existing application;
- Determination of additional needs and requests for upgrades in consultation with the Participating Parties
- Research of available historic sources and documentation relevant to the relevant historic landscapes;
- Drafting of the application design in consultation with the Participating Parties;
- Beta testing of the application with the Participating Parties; and
- Launching of the finalized application incorporating comments received from the Participating Parties.

4.6.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.6.2. The preferred consultant will be a qualified software engineer or mobile application developer. The consultant will conduct all necessary research, consultation, and site visits to develop an application design, and develop a draft application design in consultation with the Participating Parties. The final application will be developed based on comments received from the Participating Parties.

4.6.4 Standards

The project will comply with applicable standards for mobile application development.

4.6.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Preliminary design of the application; and
- Final application design.

4.6.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Newport Historic Properties, January 25, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 19 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: HORSEHEAD/MARBELLA, TOWN OF JAMESTOWN, NEWPORT COUNTY, RHODE ISLAND

[Insert ATTACHMENT 19 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Horsehead/Marbella

Town of Jamestown, Newport County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Horsehead/Marbella
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HABS	Historic American Building Survey
HPTP	Historic Property Treatment Plan
LOC	Library of Congress
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft, applicant-proposed Historic Property Treatment Plan (HPTP) for Horsehead/Marbella which is listed on the National Register of Historic Places (NRHP) (hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (the Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

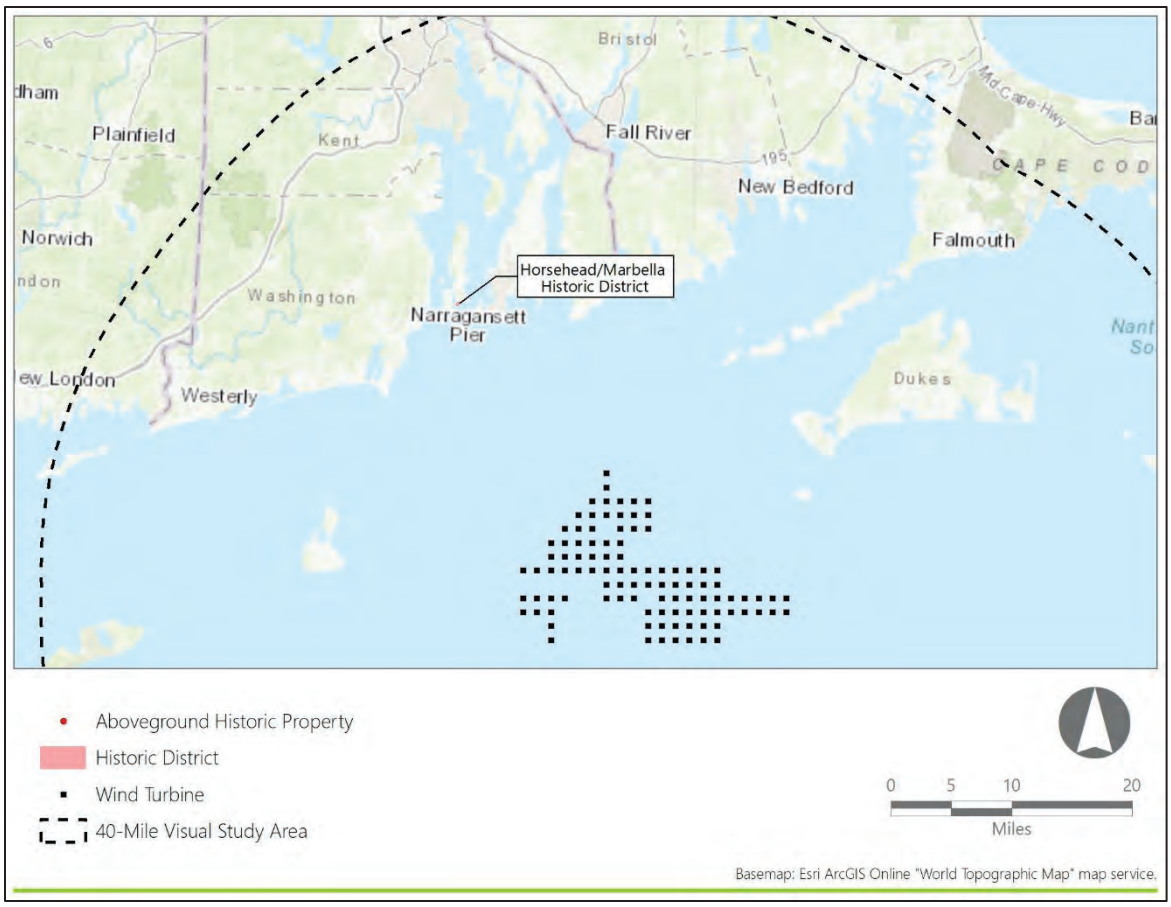
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Jamestown
- The Rhode Island Historical Preservation & Heritage Commission

Revolution Wind anticipates these parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

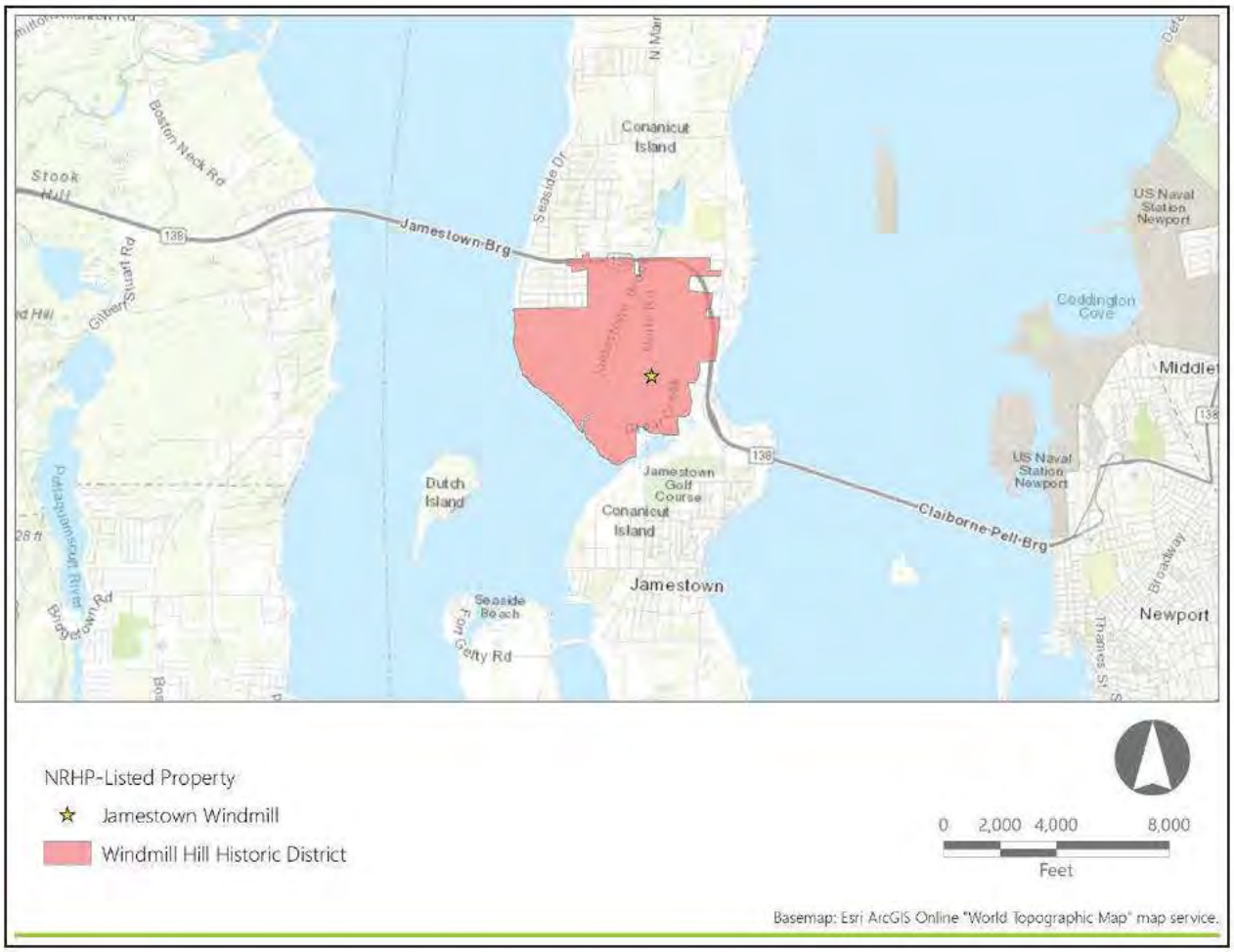
3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Horsehead/Marbella	NRHP-Listed	Jamestown	RI	NR99000675(NPS)	Private	Estates and Estate Complexes

Figure 3.1-1. Historic Property Locations



In Section 3.3 the historic property is individually considered, described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

Horsehead/Marbella is included in the property type defined in the HRVEA as "Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the area as it became a prominent vacation and recreation area for the emerging American elite.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

3.3 Horsehead/Marbella

3.3.1 Physical Description and Existing Conditions

Horsehead/Marbella is a shingle-style residence with a carriage barn located on Southwest Point in Jamestown, Rhode Island between Mackerel Cove and Concord Gulf Cove. The house is designed with granite ashlar laid in a random pattern on the first floor and the gable ends. The upper stories of the four-story tower and the western elevation are clad in wood shingles. The carriage house, located directly to the north of the main house, is designed in an L-shaped plan also with granite ashlar laid in a random pattern and the upper story clad in wood shingles (Wright, 1999). The property remains a privately-owned residence.

3.3.2 Historic Context

Horsehead/Marbella was constructed between 1882 and 1884 as a summerhouse for Joseph Wharton, co-founder of Bethlehem Steel and founder of the Wharton School of Business at the University of Pennsylvania. Wharton purchased the land in 1882 and the majority of the construction was completed in 1884; however, in 1885, Wharton purchased an adjacent property and in 1889-90 an addition was added to

the western portion of the house (Wright, 1999). Charles L. Bevins, an architect from England, designed the home(Wright, 1999).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The property was listed on the NRHP in 1999 and is significant for its architecture, landscape architecture, and its association with the development of Jamestown as a summer resort as well as its association with American industry and society. As stated above, Horsehead/Marbella is located on Southwest Point between Mackerel Cove and Concord Gulf Cove with approximately one mile of coastline.

The house and carriage house are located on an elevated portion of the property to maximize water views. According to the NRHP Nomination Form, the house and carriage house were built into the side of the hill to enhance the buildings' relationship with the landscape and the tower was likely designed to mimic a lighthouse, possibly nearby Beavertail Light. The buildings were sited to create "long perspectives" that are "extremely picturesque" (Wright, 1999). Maximizing views and the property's relationship to the water are clearly evident by the placement of the buildings on the land and the design of the house.

4.0 MITIGATION MEASURES

Mitigation measures at the Historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic American Building Survey (HABS) Documentation

4.1.1 Purpose and Intended Outcome

The HABS program was founded in 1934 and is the oldest federal preservation program. The purpose of HABS is to document historic architecture through measured drawings, photography, and historical narratives. The documentation is maintained by the Library of Congress (LOC) and is available to the public in perpetuity.

As stated above, the significance of the property and landscape of Horsehead/Marbella was documented in 1999 in a NRHP Nomination form; however, this mitigation measure proposes to complete a more intensive, thorough documentation of the property. HABS documentation for Horsehead/Marbella will consist of measured drawings, including elevations, sections, and details of this historic property, prepared by a SOI Qualified Historic Architect per 36 CFR Part 61, as well as large-format black and white photographs, and a detailed history of the property to be kept in the LOC repository.

4.1.2 Scope of Work

This work will consist of the following:

- Archival research of the history of the property, including review of any existing architectural plans or drawings, articles, historic photographs, maps, building permits, etc.;
- Photographic documentation of the existing conditions of the structures and landscape to the Participating Parties for review and comment;
- Draft measured drawings of all structures on the property including individual drawings of all elevations and sections and detailed drawings of specific architectural features, as applicable to the Participating Parties for review and comment;
- Draft report of the history of the property to be provided to the Participating Parties for review and comment;
- Consultation with the Participating Parties and any relevant stakeholders;
- Develop the final HABS documentation, addressing any comments received, to be distributed the Participating Parties; and

- Submittal of the final documentation to the HABS Office per the HABS guidelines.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The preferred consultants will have experience in HABS documentation. The draft report, drawings, and photography will be completed by SOI Qualified Professionals per 36 CFR Part 61 in accordance with applicable National Park Service and HABS guidance. The draft documentation will be provided to the Participating Parties for review and comment. The final documentation will be prepared addressing all comments received and will be provided to the Participating Parties and to the HABS Office per the HABS guidelines.

4.1.4 Standards

The mitigation measure will align with the following:

- HABS Guidelines (HABS, 2020);
- The Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft documentation; and
- Final HABS documentation.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required:

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Rhode Island Historic Properties, February 3, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 20 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE ABBOTT PHILLIPS HOUSE, THE STONE HOUSE INN, THE WARREN'S POINT HISTORIC DISTRICT, AND TUNIPUS GOOSEWING FARM, TOWN OF LITTLE COMPTON, NEWPORT COUNTY, RHODE ISLAND

[Insert ATTACHMENT 20 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Abbott Phillips House
The Stone House Inn
The Warren's Point Historic District
Tunipus Goosewing Farm
Town of Little Compton, Newport County, Rhode Island

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:



Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:



Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Abbott Phillips House, The Stone House Inn, and The Warren's Point Historic District Tunipus Goosewing Farm
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
DEIS	Draft Environmental Impact Statement
FEIS	Final Environmental Impact Statement

FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Abbott Phillips House, a Rhode Island Historical Preservation & Heritage Commission (RIHPHC) Historic Resource; the Stone House Inn, which is listed on the National Register of Historic Places (NRHP); the Warren's Point Historic District, which has been determined to be eligible for listing on the NRHP by the RIHPHC; and the Tunipus Goosewing Farm, which has been determined to be eligible for listing on the NRHP by the RIHPHC (the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (the Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
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- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

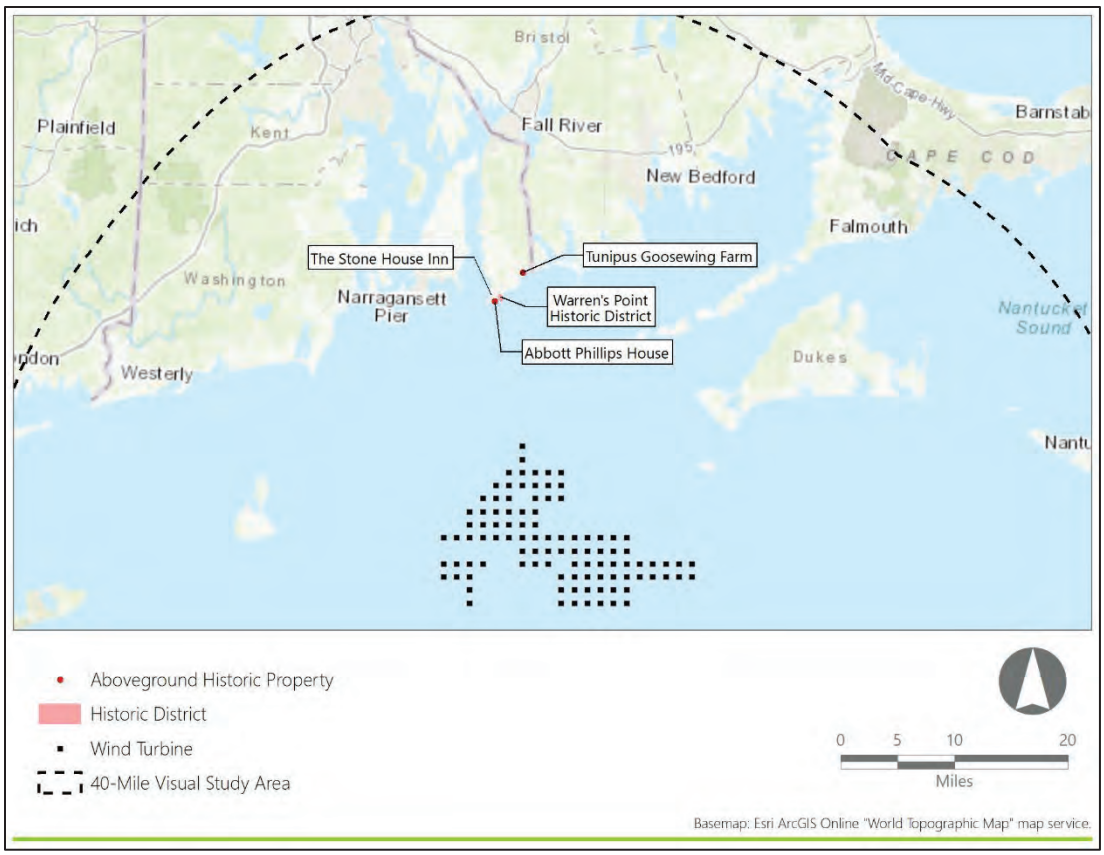
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Little Compton
- Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

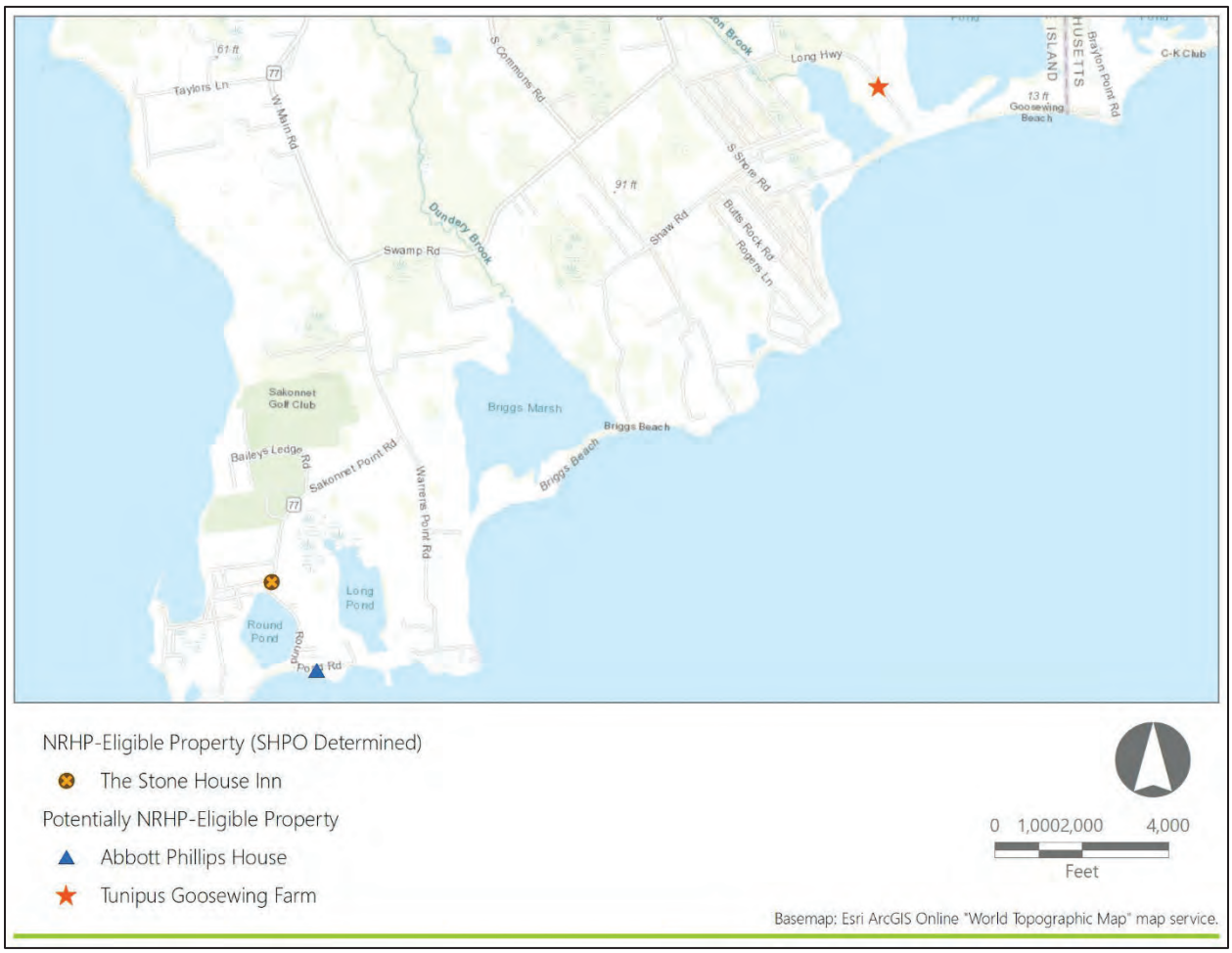
3.1 Historic Properties

This HPTP involves three historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
The Abbott Phillips House	RIHPHC Historic Resource	Little Compton	RI	827 (RIHPHC)	Private	Estates and Estate Complexes
The Stone House Inn	NRHP-Listed	Little Compton	RI	08NR00255 (NPS)	Private	Estates and Estate Complexes
The Warren's Point Historic District	NRHP-Eligible (RIHPHC Determined)	Little Compton	RI	835 (RIHPHC)	Private	Historic Buildings and Structures
Tunipus Goosewing Farm	NRHP-Eligible (RIHPHC Determined)	Little Compton	RI	831 (RIHPHC)	Private	Agricultural Properties

Figure 3.1-1. Historic Property Locations



In Sections 3.3 to 3.6, each of the historic properties is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Agricultural Properties," "Lighthouses and Navigational

Aids," and "Estates and Estate Complexes." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and structures occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Agricultural Properties" consist of historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose. These above-ground historic properties feature barns, farmhouses, and may be associated with open tracts of pastureland or agricultural fields. Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities.

Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island.

"Lighthouses and Navigational Aids" are defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

3.3 The Abbott Phillips House

3.3.1 Physical Description and Existing Conditions

The Abbott Phillips House was built circa 1926-1927 by regional architect Albert Harkness (RIHPHC, 1990). It is sited at 97 Round Pond Road on a 1.8-acre lot, just north of Mill Point, at the Atlantic Ocean. The residence is one-and-one-half stories tall, and approximately 3200 square feet. Its massing is Z-shaped with a central main block (shingled, with mansard roof and hipped dormers), two gabled wings to either side, and a round stone entrance tower where the southern sections meet. The immediate landscape around the house has been cleared but the parcel retains woodlots as well.

3.3.2 Historic Context

Henry Tillinghast Sisson, son of industrialist David Sisson, served with distinction during the Civil War, and after his death was honored by construction of a statue to his memory in Union Cemetery, in the Town of Little Compton. He worked as a mill superintendent for A. & W. Sprague until 1873, then was elected to three terms as Rhode Island Lieutenant Governor. Returning to Little Compton in the late 1870s, Henry Sisson planned a seaside summer resort just north of Mill Point, featuring curving avenues and house lots. The project was never realized and only Round Pond Road itself remains as a remnant of his plans (RIHPHC, 1990).

Architect Albert Harkness of Providence designed the house at 97 Round Pond Road for Abbott Phillips, also of Providence, and a lawyer at the firm of Hinckley, Allen, Phillips & Wheeler. Phillips lived there with his wife and their four children (Little Compton Historical Society, 2020). It remains in use today as a private residence.

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Abbott Phillips House is significant under NRHP Criterion C for Architecture. An architectural survey of the building noted "the design of this house draws on sources in French provincial vernacular architecture; the image of picturesque domesticity that it creates was popular in the 1920s and 1930s" (RIHPHC, 1990).

Located on the southern coast of Little Compton, the Abbott Phillips house was designed intentionally with views toward the Atlantic Ocean. Though its significance is derived from the architectural merit of the residence, the location affords unobstructed maritime views from both the house and grounds.

3.4 The Stone House Inn

3.4.1 Physical Description and Existing Conditions

The NRHP-listed Stone House Inn (also known as the David Sisson House) was built circa 1854 at 122 Sakonnet Point Road in the Town of Little Compton. It is sited on a nearly 3-acre lot, facing south and overlooking Round Pond. The imposing stone residence is three-and-one-half stories tall and has an associated circa 1886 barn. The residence is seven bays wide and three bays deep, with a rectangular footprint. Modern replacement windows occupy each bay. A hipped slate roof features two dormers with paired arched windows. Between them is a large octagonal belvedere. An ornate, wood-framed, two-story wraparound porch is located at the south and west sides. Multiple wings extend from the rear of the building.

3.4.2 Historic Context

Providence-based industrialist David Sisson of the Fall River Ironworks commissioned a home at 122 Sakonnet Point Road (architect unknown) which was at the time the largest residence in Little Compton, and the only one constructed of stone (Connors, 2008). The house was passed to his son Henry (see Section 3.2.2 for information on H. Sisson) and following his Lieutenant Governorship, his family used the Stone

House as their primary residence. Financial difficulties resulted in the auctioning of the home in 1902 which marks the change of its use from single-family to inn, and interior renovations and stylistic updates occurred regularly over the past 170 years. An exception to its continual operation was a two-decade closure due to flooding resulting from the Hurricane of 1938 (Connors, 2008).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Stone House Inn is listed on the NRHP and is significant under NRHP Criterion C for Architecture. It was the largest single-family dwelling in Little Compton at the time of its construction, and the only one built of fieldstone. In addition, it derives significance from its use as an inn for the past century, the "only public accommodation for travelers in this intensely private seaside community almost exclusively dominated by single-family houses" (Connors, 2008). The Stone House Inn is sited 10 feet above sea level, at an inland location, with interior views of nearby Round Pond. However, the rooftop belvedere was a unique feature designed that affords farther views to the Atlantic Ocean.

3.5 The Warren's Point Historic District

3.5.1 Physical Description and Existing Conditions

The Warren's Point Historic District is located on Warren Point, in the southern portion of the Town of Little Compton east of Sakonnet Point, on the southeastern tip of an elevated, rocky peninsula. The point is bordered by the Atlantic Ocean to the east and south and Long Pond on the west. The district includes approximately 155 acres centered along Warren Point Road, which runs north-to-south and serves as a central axis for residential development. The area is characterized by large, affluent residences set on large lots, which are for the most open lawns, oriented to afford views of the adjacent waterbodies.

3.5.2 Historic Context

Warren's Point is located east of Sakonnet Point and Long Pond, first colonized by Nathaniel Warren in the seventeenth century. Developed as the Town of Little Compton's first summer resort colony in the 1880s, its picturesque homes were built by wealthy families from the northeast and Midwest, on land subdivided from the former Kempton Farm (RIHPHC, 1990). Presenting a cohesive aesthetic, the picturesque shingle-sided houses all shared views to the Atlantic Ocean. As time moved forward, so did architectural styles. New buildings of the Cape Cod and Modernist designs were added to the collection of residences at Warren's Point through the first half of the twentieth century. Regardless of architectural style, most buildings shared similar landscapes that included manicured lawns and stone walls. The neighborhood was designed as a quiet enclave for the enjoyment of idyllic ocean views. Public access was limited by privatizing streets which continue to operate in this manner.

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Warren's Point Historic District has been determined by RIHPHC to be eligible for listing in the NRHP under Criterion A for its association with the establishment of summer coastal resorts in Rhode Island, and under Criterion C for architecture, including residences that span a wide variety of architectural styles,

constructed between 1880 and 1970 and retaining a high degree of integrity. The district is recommended as an appropriate candidate for nomination to the NRHP (RIHPC, 1990) and the *Town of Little Compton Comprehensive Plan* identifies the establishment of a voluntary historic district at Warren Point as a goal for the town relative to historic preservation (Town of Little Compton, 2018a:37).

By deed restriction, early purchasers of the property in Warren's Point were guaranteed overland access to Warren's Point Beach, ensuring a quiet, residential summer colony (Connors, 2008). It was this access and isolation that made Warren's Point a desirable oceanside retreat. Its visual and physical connection to the Atlantic Ocean is at the center of the significance of the district.

3.6 Tunipus Goosewing Farm

3.6.1 Physical Description and Existing Conditions

The Tunipus Goosewing Farm is located at 540 Long Highway on a peninsula an approximate 60-acre property between Quicksand Pond to the east, Tunipus Pond to the west, and the Atlantic Ocean to the south. According to the property card, the property currently contains a circa 1894 2-story, irregular-shaped house; two one-story circa 1999 guest houses, two one-and-a-half-story guest houses constructed circa 1815; and a circa 1850 two-story limestone, gambrel roof barn with an attached silo (Vision Appraisal, 2022). The property has been recently restored by the current owners (Morgan, 2016).

3.6.2 Historic Context

The Tunipus Goosewing Farm was constructed for the Sisson family, who moved to Little Compton from Newport in 1816 (RIHPHC, 1990). The property has remained an active farm since the eighteenth century. According to the *Historic and Architectural Resources of Little Compton, Rhode Island,* Lemuel Sisson raised cows on the property during the nineteenth century (Rhode Island, 1990).

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Tunipus Goosewing Farm is located on a peninsula overlooking Quicksand Pond, Tunipus Pond, and the Atlantic Ocean. The property also provides the only access to the town-owned Goosewing Beach. The farm has a strong maritime setting with views across the open agricultural fields to the water in three directions. The relationship of the fields, buildings, and structures on an elevated ridge to the surrounding waters is an integral part of the historic setting. The Tunipus Goosewing Farm is eligible for listing on the NRHP under Criterion A and C for its architecture and its association with the Sisson family and farming in Little Compton.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Climate Adaptation and Sustainability Plan for Historic Properties

4.1.1 Purpose and Intended Outcome

The *2018 Town of Little Compton, Rhode Island Local Hazard Mitigation Plan* identifies historic properties, including the three historic properties identified in this HPTP, as vulnerable to climate change and specifically events like flood, wind, hurricanes, and Nor'easters (Town of Little Compton. 2018b). In addition, goals of the *2018 Town of Little Compton, Rhode Island Comprehensive Plan* is to "maintain and protect the rural character, visual aesthetics and heritage of the town" as well as to "preserve buildings and sites of historic and cultural significance" (Town of Little Compton. 2018a). Many of the town's historic properties, including those addressed in this HPTP, are located along the shorelines of ponds and marshes or the Rhode Island coastline.

Prior to an event of destruction and damage resulting from a natural disaster, public engagement is needed to identify historic preservation priorities and goals, and long-range climate adaption measures that preserve the character and setting associated with historic properties. This HPTP proposes funding for the development of a Historic Preservation and Climate Adaptation Plan for the Town of Little Compton which will include public engagement to identify historic preservation and climate adaptation priorities and concerns of the local community. The intended outcome of this HPTP is to assist with the long-term preservation of the historic properties in the Town of Little Compton while addressing anticipated threats to historic resources and their setting from climate change.

4.1.2 Scope of Work

This work is anticipated to consist of the following:

- Review of existing town and county planning documents and regulations;
- Public outreach in order to identify historic preservation priorities and concerns;
- Photography and documentation (e.g. mapping) of existing conditions;
- Drafting of a historic preservation and climate adaptation plan for distribution to the Participating Parties for review and comment;
- Development of a final plan to include comments from the Participating Parties; and

- Distribution of the final plan to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of climate change and the treatment of historic properties. Public engagement sessions will be held to solicit comments, questions, and concerns from the residents of the Town of Little Compton. The sessions will inform the preparation of the draft plan which will be distributed to the Participating Parties for review and comment. Additional sessions should be held as necessary to allow for public engagement. The comments shall be addressed and incorporated in the final document which will be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with following standards:

- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The *2018 Town of Little Compton, Rhode Island Local Hazard Mitigation Plan;*
- The *2018 Town of Little Compton, Rhode Island Comprehensive Plan;*
- Town of Little Compton Planning Board guidance and regulations, as applicable; and
- Town of Little Compton Conservation Commission guidance and regulations, as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP; and
- Photographs and documentation of existing conditions.
- Draft hazard mitigation plan; and
- Final hazard mitigation plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Development of an Interpretive Exhibit/Signage at Goosewing Beach

4.2.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to use the information developed in the Climate Adaptation and Sustainability Plan to provide public education materials. The date developed will be used to produce text

for signage at the town-owned Goosewing Beach, which is accessed by Tunipus Goosewing Farm. The signage will provide a brief history of the effects of climate change and storms on Little Compton as well as information on the risks of climate change to the town's coastline.

4.2.2 Scope of Work

This work will consist of the following:

- Research available historic sources and documentation relevant to the history of climate and weather in Little Compton;
- Consultation with stakeholders and the Participating Parties;
- Draft text and sign design to be provided to the Participating Parties for review and comment;
- Development of final text and signage design which addresses any comments received the Participating Parties; and
- Production of signage to be installed at Goosewing Beach in coordination with the Participating Parties.

4.2.3 Methodology

Revolution Wind will release an RFP for consultant services for the educational materials and select a consultant to perform the Scope of Work listed in Section 4.2.1.2. The preferred consultants will have experience in developing interpretive signage. The draft text and sign design will be developed in coordination with the Participating Parties and will distributed for review and comment. The final text and design will be produced by the consultant that incorporates further comments and any additional information provided by the Participating Parties. The final approved text will be included on the final signage. The installation of the signage will be coordinated with the Participating Parties.

4.2.4 Standards

The exhibit will conform to:

- Town of Jamestown Planning Commission and Zoning Board of Review guidance, as applicable;
- The National Park Service's *Wayside Exhibits: A Guide to Developing Outdoor Interpretive Exhibits,* as applicable (NPS, 2009), as applicable; and
- The National Park Service's *Programmatic Accessibility Guidelines for National Park Service Interpretive Media*, as applicable (NPS, 2012), as applicable.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft of the text and signage design;

- Final text and signage design; and
- Signage

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Historic Context for Summer Cottage/Resort Development

4.3.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Little Compton. These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.3.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;
- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.3.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.3.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

- The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will

[2] The timeline is subject to change and is based on current available information.

be completed within 5 years of the execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Rhode Island Historic Properties, February 3, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 21 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: NINE HISTORIC PROPERTIES, TOWN OF MIDDLETOWN, NEWPORT COUNTY, RHODE ISLAND

[Insert ATTACHMENT 21 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Nine Historic Properties

Town of Middletown, Newport County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Bailey Farm The Clambake Club of Newport Paradise Rocks Historic District Sea View Villa St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse The Indian Avenue Historic District Whetstone The Land Trust Cottages The Bluff/John Bancroft Estate
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
DEIS	Draft Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Bailey Farm, which is listed on the National Register of Historic Places (NRHP); the Clambake Club of Newport, which is listed on the NRHP; the Paradise Rocks Historic District, which is a Rhode Island Historical Preservation & Heritage Commission (RIHPHC) Historic Resource; the Sea View Villa, which is a RIHPHC Historic Resource; the St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse, which is listed on the NRHP; the Indian Avenue Historic District which is listed on the NRHP; Whetstone, which is a RIHPHC Historic Resource; the Land Trust Cottages, which is a RIHPHC Historic Resource; and the Bluff/John Bancroft Estate, which is a RIHPHC Historic Resource, (the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (the Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and

further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2021) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context,

[1] The timeline is subject to change and is based on current available information.

the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

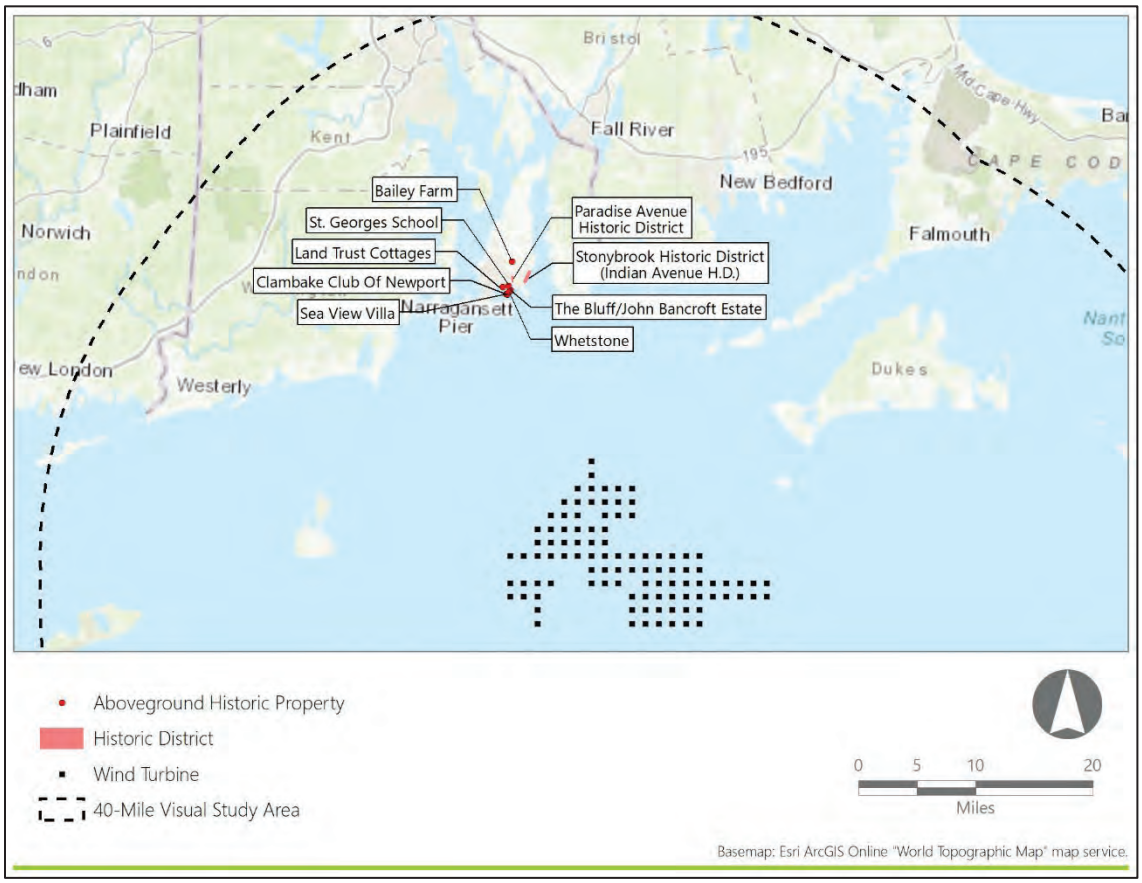
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of Middletown
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed party and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

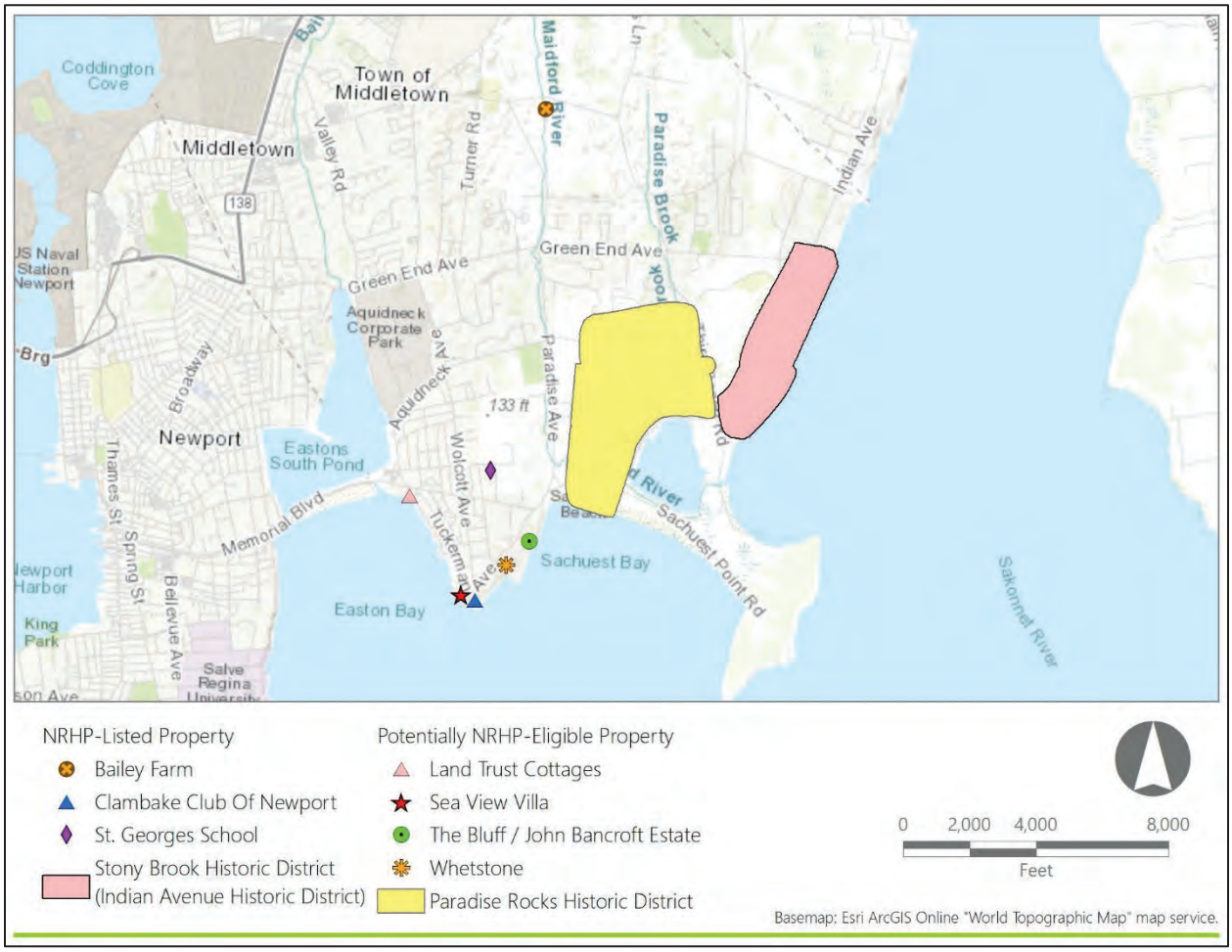
3.1 Historic Properties

This HPTP involves nine historic properties, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Bailey Farm	NRHP-Listed	Middletown	RI	84001887 (NPS Ref. #84001887)	Private	Agricultural Properties
Clambake Club of Newport	NRHP-Listed			95001267 (NPS Ref. #95001267)	Private	Recreational Properties
Paradise Rocks Historic District	RIHPHC Historic Resource			MT 4 (RI SHPO)	Private (Multiple)	Historic Buildings and Structures
Sea View Villa	RIHPHC Historic Resource			MT 75 (RI SHPO)	Private	Historic Buildings and Structures
St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse	NRHP-Listed			4001235 (NPS Ref. #04001235)	Private	Historic Buildings and Structures
Indian Avenue Historic District	NRHP-Listed			9000708 (NPS Ref. #09000708)	Private (Multiple)	Historic Buildings and Structures
Whetstone	RIHPHC Historic Resource			MT 77 (RI SHPO)	Private	Historic Buildings and Structures
Land Trust Cottages	RIHPHC Historic Resource			903	Private	Historic Buildings and Structures
The Bluff/John Bancroft Estate	RIHPHC Historic Resource			MT 78 (RI SHPO)	Private	Estates and Estate Complexes

Figure 3.1-1. Historic Property Locations



In Sections 3.23 through 3.11, each historic property is individually considered, described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Historic Cemeteries and Burial Grounds," "Agricultural

Properties," "Recreational Properties," and "Estates and Estate Complexes." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Historic Cemeteries and Burial Grounds" consists of cemeteries identified by federal, state, or local governmental agencies as having historic significance. These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development.

Historic cemeteries and burial ground vary throughout the study area. Small, private, non-denominational and family cemeteries were relatively common in New England, and many have survived to present-day. Many examples of small cemeteries were associated with specific farms or families and were frequently placed within the available agricultural lands surrounding a farmstead or near multiple associated family farms. Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. Cemeteries in urban locations expressing such patterns may include formal design elements associated with the "rural cemetery movement" of the 19th century, which sought to create naturalistic, park-like settings to express "an

appreciation of nature and a sense of the continuity of life" (NPS National Register Bulletin 41: 6). Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views.

"Agricultural Properties" consist of historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose. These above-ground historic properties feature barns, farmhouses, and large, open tracts of pastureland. Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities.

Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from

beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer "cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

3.3 The Bailey Farm

3.3.1 Physical Description and Existing Conditions

The Bailey Farm (NPS Ref. #84001887, originally inventoried as the Chapman House and Farm) is an approximately 47-acre farm located at 373 Wyatt Road in Middletown, Road Island, approximately 2.25 miles from the coastline in Sachuest Bay (Figure 3.1-1). The property consists of a central, main farm complex including the original farmhouse, a barn, associated outbuildings including sheds and garages, and a cistern. The fields surrounding the central farm complex are still in use (predominantly as a vineyard) and are bound and interlaced with dry-laid stone walls. The Bailey family burying ground is located in the northwestern corner of the parcel, partially enclosed by a stone wall and modern metal fence. The Maidford River (a small brook) runs north to south, bisecting the property immediately west of the central farm complex (Nebiker et al., 1984; RIHPC, 1979a:40).

A more modern house (constructed circa 1930) with associated outbuildings is located in the northwestern corner of the property north of the Bailey family burying ground but does not contribute to the historical significance of the Bailey Farm (Nebiker et al., 1984).

The frame of the Bailey farmhouse dates from the mid-eighteenth century but was renovated in the nineteenth century Greek Revival style, including a large brick center chimney and three-bay façade. The outbuildings date from the mid-nineteenth to early-twentieth century (likely replacements for earlier barns and sheds) and have gabled roofs, but have been updated with modern shingles, windows, and fixtures (such as solar panels). Though the outbuildings have been updated and/or replaced, they retain their original placement and orientation to the road and the surrounding landscape (Nebiker et al., 1984).

3.3.2 Historic Context

The Bailey Farm was once a farmstead occupying as much as 100 acres that was owned and occupied by the Bailey family, who were settlers of nearby Newport, throughout the eighteenth and into the nineteenth century. When the farmhouse underwent its Greek Revival renovations in 1838 the property was owned by Easton Bailey. The property was sold by the Bailey family in the 1850s and was bought and sold several times before being purchased by Peleg Sherman in 1878. His family owned the land until 1918, until it was sold to the Nunes family, whose descendants still owned the property at the time of the Bailey Farm's nomination for the NRHP in 1979. In the year 1850, under the operation of James Gardiner, the Bailey Farm produced $200 worth of fruits and vegetables, and $210 worth of meat, marking a relatively prosperous operation compared to other Rhode Island hill farms (RIHPC, 1979b; RIHPC, 1979a:40; Nebiker et al., 1984).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The NRHP-listed Bailey Farm meets Criterion A for its associations with the nineteenth-century agriculture of island farms of Narragansett Bay and NRHP Criterion C for its importance as an example of architecture and engineering of the Greek Revival, with a period of significance from 1825-1849 (Nebiker et al., 1984). The Bailey Farm was listed on the NRHP in 1964 and enjoys views to Sachuest Bay.

3.4 The Clambake Club of Newport

3.4.1 Physical Description and Existing Conditions

The Clambake Club of Newport is a one-story building located on the bluff at Easton Point. It is a wood-framed, wood-shingled structure laid out in a L-shaped plan. Each wing is covered by a gabled roof, with cedar shingles, punctuated by large stone chimneys. Horizontal cedar-board siding covers the exterior. Several minor additions protrude from the sides of the original building. Areas of exposed foundation show a mix of irregularly cut stone and/or stucco. On the south side of the structure, which drops off to the water, the building is supported by masonry piers (Werenfels, 1995; RIHPC, 1979b:34).

The main entrance on the north side of the structure is cross-gabled, with an arched fan-light window above the wood-paneled entrance door. Stone piers support a flat roof outside the main entrance. The south side of the structure is characterized by a series of enclosed porches. The porches all have an arrangement of

large viewing windows that offer views of the Rhode Island Sound. The porch at the western end of the south side of the structure has a stone terrace outside (Werenfels,1995).

Two outbuildings are also located on the property, the Chef's Cottage and the Guest Cottage. The Chef's Cottage is a small, wood-framed, one-story building with a gabled roof on the north end of the property. The exterior of the Chef's Cottage is also covered in horizontal cedar-board siding. The roof is made of asphalt shingles. The Guest Cottage is a small, wood-framed, one-story building with a gabled roof located on the western end of the property. The Guest Cottage has a gabled entrance portico, and a large bay window facing the Rhode Island Sound to the south. The exterior to the Guest Cottage is covered in horizontal cedar-board siding, and has a cedar shingle roof (Werenfels,1995).

3.4.2 Historic Context

The Clambake Club of Newport has occupied the site at Easton's Point since the 1890s, officially organizing as a club to utilize the property in 1895. An existing dwelling and stable on the property were improved upon beginning in 1897 when the entered into a formal rental agreement with the owner of the property. In 1903 the Clambake Club of Newport property was purchased by founding member Center Hitchcock, who constructed the first clubhouse facility specifically built for the Clambake Club's activities sometime between 1903 and 1907. Club records indicate the facility was likely designed by Colonel Francis Hoppin. A photograph from 1910 shows a simple, one-story building with gabled roofs (Werenfels, 1995).

The original building (with some small additions) survived until September 21, 1938, at which time a hurricane destroyed portions of the building on its southern and eastern ends, though the main body of the building survived the storm. The club was rebuilt in 1939 by William L. Van Alen of Wilmington, Delaware, though it is unclear how much of the original structure was incorporated into the design of the new building. However, the simple, one-story gabled-roof character of the building remained the same (Werenfels, 1995; RIHPC, 1979b:34).

The two outbuildings are not depicted on the 1921 Sanborn Map Co. *Atlas of Newport, Jamestown, Middletown and Portsmouth, Rhode Island* (Sanborn, 1921) and it is unclear if they existed before the 1938 hurricane or if they were later additions to the property (Werenfels, 1995).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Clambake Club of Newport is significant under NRHP Criterion A for its associations with the late nineteenth-century and early twentieth century entertainment and recreation movements, specifically the seaside recreational facilities on Rhode Island and New England coastlines used for clambakes, social gatherings, and sporting activities such as fishing and shooting. The Clambake Club of Newport has a period of significance from 1875-1949 and is still in use as a private club today (Werenfels, 1995). The location of the main building, and both outbuildings speak to the property's historic association with views to and enjoyment of the seascape. Large bay windows and multiple porches extending towards the water show the importance of the ocean views and the immediate proximity of the waterfront to the historical character of the property. It was listed in the NRHP in 1995.

3.5 The Paradise Rocks Historic District

3.5.1 Physical Description and Existing Conditions

The Paradise Rocks Historic District is located at the south end of Middletown, to the north of Gardiner Pond and Second Beach. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:17), "On an island devoted largely to agricultural, residential, commercial, and industrial uses, the Paradise Rocks area is a superb and unique natural enclave." The Paradise Rocks Historic District is a largely undeveloped area, with portions of the district set aside as wildlife sanctuaries. The district encapsulates Nelson Pond and Paradise Brook, and is named for Paradise Rocks, a north-south trending outcropping of fine blue-hued conglomerate rock" (RIHPC, 1979a:2). The Paradise Rocks Historic District consists of several resources, both natural and man-made. These include Hanging Rock, the Smith-Gardiner-Norman Farm, Gray Craig Estate, the Allen-King-Norman Farm, and the Norman Bird Sanctuary and Museum. The history of each resource is described in the following section.

3.5.2 Historic Context

For most of its history, the area within Paradise Rocks Historic District was left it its natural state. Unlike the surrounding area (i.e., Stonybrook Historic District), the District did not become a location for numerous sprawling summer estates. During the nineteenth century, the area was utilized for agriculture and hunting. By the twentieth century more "passive recreation" was enjoyed in the bird sanctuary, with only several residences constructed (RIHPC, 1979a:17). A description and history of some of the resources within the District is listed below.

Hanging Rock

Hanging Rock is a conglomerate-rock mass near Second Beach that juts out into a marsh, with an abrupt cliff-like break at its south end. According to the Rhode Island Historical Preservation & Heritage Commission, (1979a:17-18), the rock was also known as "Berkeley's Seat" during the eighteenth century, as it was a favorite location of Bishop George Berkeley. Today, it is a popular tourist attraction.

Smith-Gardiner-Norman Farm (Paradise Farm)

The Smith-Gardiner-Norman Farm is an NRHP-listed historic district located on 129 acres. The property consists of a mid-eighteenth-century farmhouse with later additions, a mid-nineteenth century barn, two agricultural outbuildings, two burial sites, a stone-lined sheep pen, stone-lined pastures and fields, wooded areas, Hanging Rock, and an abandoned bluestone quarry. The farmhouse consisted of a two-and-a-half story structure rebuilt in the late nineteenth century in the Colonial Revival style. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:18), the farmhouse had a gambrel roof, two interior brick chimneys, a central entry with sidelights in a veranda, gable dormers in front, and a flat roof addition.

The property was primarily farmed by tenant farmers from 1850 to 1900. However, it was best known as the summer residence of George H. and Abbie Kinsley Norman who bought the property in 1898. Mabel

Norman Cerio, the last private owner of the Smith-Gardiner-Norman Farm, adapted the farmhouse and immediate neighboring fields for use as a main residence in 1915. Cerio bequeathed much of the estate to the Norman Bird Sanctuary Trust for use as a bird sanctuary in 1949, which continues to be its use today. At the time of Cerio's death, a 16-acre parcel comprising the Paradise Farmhouse, outbuildings, and agricultural fields along Third Beach Road remained in the hands of the Norman heirs. Various fields were leased for commercial use until the 1990s. In the late 1990s, the Norman Bird Sanctuary purchased this parcel and reintegrated it into the sanctuary (Town of Middletown, 2015).

Gray Craig

Gray Craig, also known as the Michael M. Van Bueren House, was once the farm of one the earliest families in Middletown during the eighteenth century. The resource as it exists today consists of a large two-and-a-half story stone house with four chimneys and views of Sachuest Beach and the Atlantic Ocean. Updates were made to the estate by Mary and Michael Van Bueren during the early twentieth century to transform the estate into a chateau-like house. Additions included kennels, greenhouses, a walled and secret garden, a tea house, a gatehouse, a stable, and a barn (RIHPC, 1979a:18).

Allen-King-Norman Farm

The Allen-King-Norman Farm consists of a two-and-a-half story Federal-era structure with large brick and central chimneys. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:18), the farmhouse had a central portico entry in a 5-bay, south-facing façade, and a large wing at a right angle at the rear. There was a complex of wood-shingle and stone outbuildings at the rear, and the grounds, with stone walls, were well landscaped. The farm was opened to the public as a bird sanctuary in 1950 and named for George H. Norman and George H. Norman, Jr.

Norman Bird Sanctuary and Museum

The Norman Bird Sanctuary, maintained by the Rhode Island Audubon Society, opened to the public in 1950 and consisted of a 450-acre tract of woodland, field, marshes, and rocky hills. Portions of the Sanctuary was formed from the Smith-Gardiner-Norman Farm and Allen-King-Norman Farm. A converted barn and several small outbuildings serve as the headquarters which comprise the bird sanctuary (RIHPC, 1979a:18).

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Paradise Rocks Historic District is an NRHP-eligible resource, possibly under Criterion A and C. The district contains a typical landscape within coastal New England and Middletown that was utilized for agriculture by Europeans for over 200 years. In addition, the few houses within the district are typical examples of nineteenth century residences within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. The homes are also in keeping with the vernacular building tradition of coastal New England.

One of the resources within the District, the Smith-Gardiner-Norman Farm (also known as Paradise Farm), was listed in the NRHP under Criterion A and C for its significance in the history of Middletown's settlement and agriculture. According to the NRHP Inventory Nomination Form (Connors, 2007), the Paradise Farm is "a well-preserved example of Rhode Island's eighteenth and nineteenth century island farms, typical of its

region in its form and in its history of use and ownership until the early twentieth century." Contributing structures included a farmhouse, a two-car garage, carriage shed, barn, stone walls, agricultural fields, orchard, family garden, sheep pen, Gardiner Family Burial Plot (1786-1872), gravesite (date unknown), Hanging Rock, and quarry. The period of significance for the Farm spans from 1750 to 1949. While the early period's significance included the history surrounding the historic farmstead, the later period's significance included the pattern of development in the history of the island towns and the use of agricultural areas in island towns as country retreats for wealthy families. The Smith-Gardiner-Norman Farm may also be NRHP eligible under Criterion D, as it may yield evidence about the lifeways of coastal Native Americans as well as successive owners, tenants, and slaves (Connors, 2007).

3.6 The Sea View Villa

3.6.1 Physical Description and Existing Conditions

The Sea View Villa is a two-and-a-half story, multi-gabled chateau with a complex plan, several porches, and wood-carved details on the exterior (RIHPC, 1979a:34). The house is near the vicinity of Easton's Point on Tuckerman Avenue. The house is less than 100 meters from the shoreline and approximately 40 feet above mean sea level, overlooking the Atlantic Ocean. Sea View Villa is currently a privately owned apartment complex (Sea View Villa, n.d.).

3.6.2 Historic Context

The Sea View Villa was built by General Zachariah Cantey Deas in the 1880s. The original lot, much like those in other sections of Middletown, were laid out by a syndicate of Boston businessmen. In 1945, the property was purchased by Tony and Mary Spiratos, whose family continues to own the property. During this time, Sea View Villa was host to President Eisenhower's Cabinet and the White House's staff. During the latter half of the twentieth century and to the present, the Spiratos family made major renovations to the estate, updating the various rooms (such as the old servant's quarters) into apartments for rent (RIHPC, 1979a:6; Sea View Villa, n.d.).

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Sea View Villa is an NRHP-eligible resource and appears to meet Criterion C. The house is a typical example of a late-nineteenth century residence within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. In addition, the house is in keeping with the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual residence.

3.7 The St. George's School: Church of St. George, Little Chapel, and Memorial Schoolhouse

3.7.1 Physical Description and Existing Conditions

The St. George's School (NPS Ref. #04001235) collectively refers to three buildings (attached to one another) together occupying less than one acre on a 125-acre school campus: the Church of Saint George, the

Memorial Schoolhouse, and the Little Chapel. Approximately 50 other structures, as well as lawns and athletic fields, cover the rest of the campus. Approximately half of the other structures were built between the 1880s and 1930s; some of those may also warrant NRHP nomination. The Memorial Schoolhouse, Church of Saint George, and the Little Chapel occupy the center of the campus between landscaped courtyards. The entire campus has been likened to an English manor estate, with buildings consistently between one and three stories, with gabled roofs, red brick exteriors, and Georgian Revival and Tudor Revival architecture (Cavanaugh, 2004: Section 7, pg. 1-2).

While the original campus was laid out in quadrangles, preserving ocean views to the east and south was later considered. The hilltop location of the school property offers "magnificent views of Second Beach, Sachuest Bay, Rhode Island Sound" and other landmarks (Cavanaugh, 2004: Section 7, pg. 1). Currently, the school serves as a private, Episcopal, coeducational boarding school (St. George's School, n.d.).

The Little Chapel

The Little Chapel is a brick one-room building with one-story, and a gabled roof of green slate on a poured concrete foundation. Constructed between 1909 and 1911, the Tudor Revival style building was relocated in 1924 less than 100 feet away from its original site to make way for construction of the Church of Saint George. The Little Chapel is now attached to the larger Church of Saint George on the larger structure's southeast corner in the position of a Gothic church's "Lady Chapel." The Little Chapel was modified between 1924 and 1928 to match the style of the Church of Saint George. The Little Chapel now exhibits a parapeted gable roof, Gothic pointed-arch doorway, diamond-paned leaded casement windows, and exposed roof beams and trusses. At the time of its inclusion on the NRHP, the slate roof and gutters of the Little Chapel were in disrepair (Cavanaugh, 2004: Section 7, pg. 3-5).

The Memorial Schoolhouse

The Memorial Schoolhouse is a two and one half-story red brick building built in the Tudor Revival style. It was constructed between 1921 and 1923 as a memorial to the alumni of the school who died in World War I. It has cast stone trim, a multi-gabled slate roof, and a wood-framed cupola. The main entranceway is semi-hexagonal with an arched doorway and Renaissance detailing. A miniature turret is adjacent to the north slype door. The schoolhouse is oriented on and east-west axis, and its primary façade faces the south. The schoolhouse is in very good condition, and retains full integrity of setting, feeling, and association (Cavanaugh, 2004: Section 7, pg. 6-11).

The Church of Saint George

The Church of Saint George was constructed between 1924 and 1927 by one of the major church architects of his generation, Ralph Adams Cram of the Boston firm of Cram & Ferguson. According to the St. George's School NRHP registration form, "the Gothic Revival Style Church of St. George (commonly referred to as "the Chapel") is not only the most visually prominent, but also the most historically and architecturally significant building on campus" (Cavanaugh, 2004; Section 7, pg. 12).

While notably smaller than medieval period counterparts, the Church of Saint George presents the Gothic feelings of height and weightlessness. Character defining features include: the stone materials; the

buttresses; the rib-vaulted roof; the pointed-arch window and door openings; the stained-glass windows outlined with stone tracery; the cloister with its fan-vaulting, pointed arches and stone tracery; the great tower; and the copious ornamentation inside and out (Cavanaugh, 2004: Section 7, pg. 12).

The Church of Saint George was constructed primarily of gray limestone, with areas of marble, granite and limestone interior. The roof is lead coated copper. The church is arranged in a T-shape, with a long nave running east-west and a short transept at the west end. The nave and the transept have end-gabled roofs. The church has four exterior towers, with the largest square tower rising 147 feet. A long, narrow, two-story stone structure called a slype connects the church with the Memorial Schoolhouse (Cavanaugh, 2004: Section 7, pg. 12).

3.7.2 Historic Context

The St. George's School was founded as an Episcopal school for boys in 1896 by Mr. John Byron Diman, a deacon in the Episcopal Church and alumnus of Brown, Cambridge, and Harvard. At the time, Rhode Island did not have a state-supported public high-school system, so the St. Georges School filled the need for private education. Originally the school rented a location in Newport, before relocating in 1901 to the present-day location due to Diman's love of the "rural, naturalistic qualities and extensive ocean views" (Cavanaugh, 2004; Section 8, pg. 45). By 1906 the school had 88 students, and construction of new campus buildings included classrooms, dormitories, residences, a dining hall and other supporting facilities. The Little Chapel was constructed between 1909 and 1911 to serve as a place for morning communion services, confirmation classes, Bible study, and community meetings. The Memorial Schoolhouse, constructed between 1921 and 1923, was built to memorialize those school alumni who had died in World War I. The Church of Saint George, constructed between 1924 and 1928, was built to provide religious services to the entire Episcopal community of St. George's School (Cavanaugh, 2004: RIHPC, 1979a:31).

3.7.3 NRHP Criteria and the Maritime Visual Setting

The St. Georges School is significant under NRHP Criterion A for reflecting the rise of faith-based private education in America, particularly of Episcopal boarding schools in New England, at the end of the 19th century and the beginning of the 20th century. Collectively and individually, the three buildings which comprise the NRHP listing are also significant Under Criterion C. The Little Chapel and the Memorial Schoolhouse both represent the Tudor Revival style. The Church of St. George is a masterpiece of English Gothic Revival ecclesiastical architecture, representing the work of one of the major church architects of his generation, Ralph Adams Cram of the Boston firm of Cram & Ferguson (Cavanuagh, 2004: Section 8, pg. 33).

The extensive and magnificent ocean views contribute to the St. George's School's integrity of setting, feeling, and association as they were a primary reason that founder John Diman chose the location. Layout and orientation of the campus buildings in relation to the east and south facing views was also considered during construction. The St. George's School was listed in the NRHP in 2004.

3.8 The Indian Avenue Historic District

3.8.1 Physical Description and Existing Conditions

The Indian Avenue Historic District, previously known as the Indian Avenue Historic District, is located in the eastern portion of Middletown, between Green End Avenue on the north and Third Beach Road on the south. The district encompasses a one-quarter mile section of Indian Avenue and contains approximately a dozen noteworthy Late Victorian and early twentieth century structures. An 1884 stone chapel, St. Columba's Chapel, is located nearby (RIHPC, 1979a:13). Most of the houses are located to the east of Indian Avenue, overlooking the Atlantic Ocean, with many consisting of one-and-a-half to two-story houses set back from the road and obscured by trees. The original homes were typically constructed from stone or vertical board-and-batten walls. Additional outbuildings, such as carriage houses, were and continue to be a common feature of these large estates (RIHPC, 1979a:14-15).

The land gently rises from sea level at the river's shore to just over 50 feet at the district's northwestern corner. Just south of Vancluse Avenue, which forms part of the district's western edge, a small creek crosses Indian Avenue and meanders into the Sakonnet River east of the intersection of Vaucluse and Indian Avenues. The district's principal properties comprise a large, early twentieth century multiple resource estate with landscaped grounds, subdivided in the late twentieth century. It is comprised of four contributing buildings, five non-contributing buildings, and two discrete contributing sites. The contributing buildings include 75 Vancluse Avenue, 501 Indian Avenue, 502 Indian Avenue, 515 Indian Avenue, 521 Indian Avenue. The properties were largely divided from the Edward C. Knight, Jr. estate (Stonybrook) designed by Horace Trumbauer in 1928. In addition to the main house on a waterfront lot, the Knight estate extended across Indian Avenue, with formal gardens and outbuildings in the same style as Stonybrook (i.e., Late Gothic Revival) (Woodward, 2009).

3.8.2 Historic Context

From the time of European settlement in the eighteenth century until the mid-nineteenth century, the land within the Indian Avenue Historic District was primarily utilized for agriculture. A farmhouse stood at each end of the present-day district. In addition, a ferry landing near the end of Green End Avenue, originally known as Taggart's Ferry, carried farm produce between Little Compton and Newport until about 1870 (RIHPC, 1979a:13).

After the Civil War, the nearby town of Newport saw a marked increase in the purchase and construction of summer estates. Inspired by this growth, Eugene Sturtevant began his effort to make Middletown the "court end of the island" in 1871 (RIHPC, 1979a:6). Sturtevant and a partner purchased two and a half miles of farmland along the Sakonnet shore and money was invested into a 5-mile fenced road (Indian Avenue). The plat featured the road flanked by one hundred rectilinear lots, with an average frontage of 200 feet and depths of 400 feet or more (Woodward, 2009). The Indian Avenue neighborhood developed on a small scale, with the first purchases being made by Philadelphia and Hartford families. The advent of the automobile attracted more development within the district, as it was easier to drive the 3.5 miles from Newport (RIHPC, 1979a:13).

For the first three decades of the twentieth century, many new summer estates were constructed, though much of the original plat remained in agricultural use (Woodward, 2009). A pattern of summer estates with ample landscaped grounds interspersed with occasional farm fields defined the district in the decades after World War II. In the last quarter of the twentieth century another round of development added a new generation of large houses, filling in formerly undeveloped land or subdivided portions of the earlier estates (Woodward, 2009; RIHPC, 1979a:13).

3.8.3 NRHP Criteria and the Maritime Visual Setting

The Indian Avenue Historic District was added to the NRHP in 2009 under Criterion C. According to the NRHP Nomination Form (Woodward, 2009), the district is a "…notable example of the high-style residential development associated with the growth of an extensive summer-resort society that was centered in Newport, Rhode Island and spread into the neighboring towns of Middletown, Portsmouth, and Jamestown in the late nineteenth and early-twentieth centuries. The district… is the community's largest, most fully developed, and most intact representative of this phenomenon." In addition, it represents the work of a prominent architect of the time, Horace Trumbauer, and exemplified a style of life common to other sections of Middletown (RIHPC, 1979a:13). The district as a whole derives historic significance from its seaside location and maritime visual setting, as the location specifically relied on its coastal setting and maritime view in order to attract homeowners. According to the Rhode Island Historical Preservation & Heritage Commission (1979a:13), the maritime visual setting was an important aspect of the estates and District, as the "well sited lots afford[ed] good views of the river and ocean."

3.9 The Whetstone

3.9.1 Physical Description and Existing Conditions

The Whetstone is a two-story Early Victorian structure with two brick interior chimneys, round-head dormers, a front porch, and several additions. It is sited on the bluff overlooking Whetstone Point and Long Rock and Sachuest Bay at 455 Tuckerman Avenue (RIHPC, 1979a:34). The house is located approximately 100 meters from the shoreline and at approximately 40 feet above mean sea level, overlooking the Atlantic Ocean. The Whetstone is currently a privately owned home.

3.9.2 Historic Context

The Whetstone was built in 1860 by Lewis P. W. Balch, a doctor from New York, prior to the growth of Newport's summer colony after the Civil War (RIHPC, 1979a:6, 34). Prior to this, the Whetstone home was primarily located within a rural and agricultural environment. After the Civil War, increased construction in summer houses occurred on the south and east side of Tuckerman Avenue, as the lots offered views of the Atlantic Ocean. During the twentieth century, additional houses and roads were constructed to the north of the Whetstone. Currently, the Whetstone house is located within a moderately dense residential area.

3.9.3 NRHP Criteria and the Maritime Visual Setting

The Whetstone is an NRHP-eligible resource and appears to meet Criterion C. The house is a typical example of a mid-nineteenth century residence within Middletown, Rhode Island, embodying the distinctive characteristics of the type, period, or methods of construction. In addition, the house is in keeping with the vernacular building tradition of coastal New England. The property's natural landscape and maritime visual setting are a key component of its historic significance as a mid-nineteenth century vernacular seaside residence.

3.10 The Land Trust Cottages

3.10.1 Physical Description and Existing Conditions

The Land Trust Cottages are a group of five Shingle-style houses located off of Purgatory Road, at the east end of Easton Beach. The cottages are comprised primarily of two-and-a-half-story, gambrel-roof structures closely grouped together located between a tall hedgerow along Purgatory Road and Easton Bay.

3.10.2 Historic Context

The Land Trust Cottages were laid out for development in 1885-1887 under the guidance of Frederick Law Olmsted. The cottages were constructed as part of a wave of post-Civil War development in Middletown and Newport, primarily by businessmen and investors from Boston. In 1887-1888 E. B. Hall, a Boston builder, erected the cottages on a relatively small lot, positioned to take advantage of views of Easton Bay. The cottages have remained private residences since their construction, with relatively minimal alteration to materials or form (Nebiker and Kennedy, 1990; Jordy, 2012; Dunn, 2014).

3.10.3 NRHP Criteria and the Maritime Visual Setting

The Land Trust Cottages were included in the *Historic and Architectural Resources of Middletown RI* multi-property documentation form (Nebiker and Kennedy, 1990), but have not been formally listed on the NRHP. The RIHPHC have classified the property as potentially eligible for listing on the NRHP. The Land Trust Cottages appear to meet NRHP eligibility Criterion C as an intact, representative example of seaside Shingle-style residences, as well as for the associations with Frederick Law Olmsted. The coastal location and maritime visual setting of the cottages are a key component of their historic significance as late-nineteenth century summer cottages.

3.11 The Bluff/John Bancroft Estate

3.11.1 Physical Description and Existing Conditions

The Bluff/John Bancroft Estate is located at 575 Tuckerman Avenue. The property extends from the roadway to the bluffs overlooking Sachuest Bay. The building is an irregular-shaped, five-story Shingle-style residence originally constructed in 1895, converted into apartments in 1950, and renovated into ten luxury condominiums in 2006.

3.11.2 Historic Context

The Bluff/John Bancroft Estate was designed by architect William Ralph Emerson (regarded as one of the leading architects of the Shingle Style) for John Chandler Bancroft, a businessman and artist and collector of Japanese art from Boston, with a Japanese garden designed by Frederick Law Olmsted. The house was constructed on a bluff overlooking Sachuest Bay to take advantage of the sweeping views of the bay. The house was constructed as part of a wave of post-Civil War development in Middletown and Newport, primarily by businessmen and investors from Boston. Although Bancroft passed away in 1901, the building is still associated with his name due to his connections and contributions to the art world of Rhode Island in the late nineteenth century (RIHPC, 1979; Sieger, 2000; Historic New England, 2016; Dunn, 2017; WUC, 2020).

3.11.3 NRHP Criteria and the Maritime Visual Setting

The Bluff/John Bancroft Estate was included in the *Historic and Architectural Resources of Middletown RI* multi-property documentation form (Nebiker and Kennedy, 1990), but has not been formally listed on the NRHP. The RIHPHC have classified the property as potentially eligible for listing on the NRHP. The Bluff/John Bancroft Estate appears to meet NRHP eligibility National Register Criterion A for its associations with John Chandler Bancroft, and Criterion C as an intact, representative example of the work of William Ralph Emerson, a prominent New England architect renowned for his Shingle-style designs, as well as the associations with Frederick Law Olmsted, who designed the Japanese garden on the property that is partially intact. The property's coastal location and uninterrupted maritime visual setting are a key component of its historic significance as a mid-nineteenth century seaside estate.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Development of a Coastal/Shoreline Resiliency and Climate Adaptation Plan for Historic Properties

4.1.1 Purpose and Intended Outcome

The *2019 Strategy for Reducing Risks from Hazards in Middletown, Rhode Island*, states that properties are at "significant erosion risk due to coastal surge" and properties located in floodplains were identified as a top concern for the Town (Town of Middletown, 2019). In addition, the 2015 *Comprehensive Community Plan* states that the protection and enhancement of historic properties, including the eight historic properties included in this HPTP, is identified as important to the town and its economy (Town of Middletown, 2015).

This purpose of this mitigation measure is to develop a Coastal/Shoreline Resiliency and Climate Adaptation Plan for the Town of Middletown to address these concerns. Public engagement will allow the Town to make optimal decisions about property management and preservation. The plan will provide the Town and historic property owners with specific measures that can be taken to protect their historic properties from flooding, coastal erosion, and other climate related threats. The plan may also include an update of the historic properties inventory per the goals of the 2015 *Comprehensive Community Plan*.

4.1.2 Scope of Work

This scope of work will consist of the following:

- Review existing Town planning and hazard mitigation documents, guidance, and regulations;
- Review existing historic properties inventory;
- Photograph and document existing conditions;
- Solicit public engagement to discuss town-wide historic preservation priorities;
- Develop an updated historic property inventory, if required;
- Distribute the updated historic property inventory to the Participating Parties, if warranted;
- Draft a historic property-specific Coastal/Shoreline Resiliency and Climate Adaptation Plan;
- Distribute the draft plan to the Participating Parties for review and comment;
- Develop the final plan to be distributed the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The preferred consultants will have experience in developing Coastal/Shoreline Resiliency and Climate Adaptation Plans for historic properties. The consultants will engage the public and Participating Parties to develop a list of prioritized action items to protect and preserve historic properties. The draft and final plans will be developed in consultation with the Participating Parties.

4.1.4 Standards

The mitigation measure will comply with following standards:

- Town of Middletown Planning Regulations;
- Current Climate Adaptation, Resiliency, and related guidance;
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68;
- The Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP; and
- Photographs and documentation of existing conditions.
- Draft updated historic property inventory, if required
- Final updated historic property inventory, if required
- Draft Coastal/Shoreline Resiliency and Climate Adaptation Plan; and
- Final Coastal/Shoreline Resiliency and Climate Adaptation Plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Historic Context for Summer Cottage/Resort Development

4.2.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Fairhaven. These areas were attractive to the upper class for their proximity to Boston and New York and

their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;
- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.2.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with the Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm –Rhode Island Historic Properties, February 3, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 22 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: PUCATEST NECK HISTORIC DISTRICT, TOWN OF TIVERTON, NEWPORT COUNTY, WASHINGTON COUNTY, RHODE ISLAND

[Insert ATTACHMENT 22 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review and Comment by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Puncatest Neck Historic District

Town of Tiverton, Newport County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Puncatest Neck Historic District
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
APE	Area of Potential Effects
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for Puncatest Neck Historic District, a Rhode Island Historical Preservation & Heritage Commission (RIHPHC) Historic Resource, (the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable National Register of Historic Places (NRHP) criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

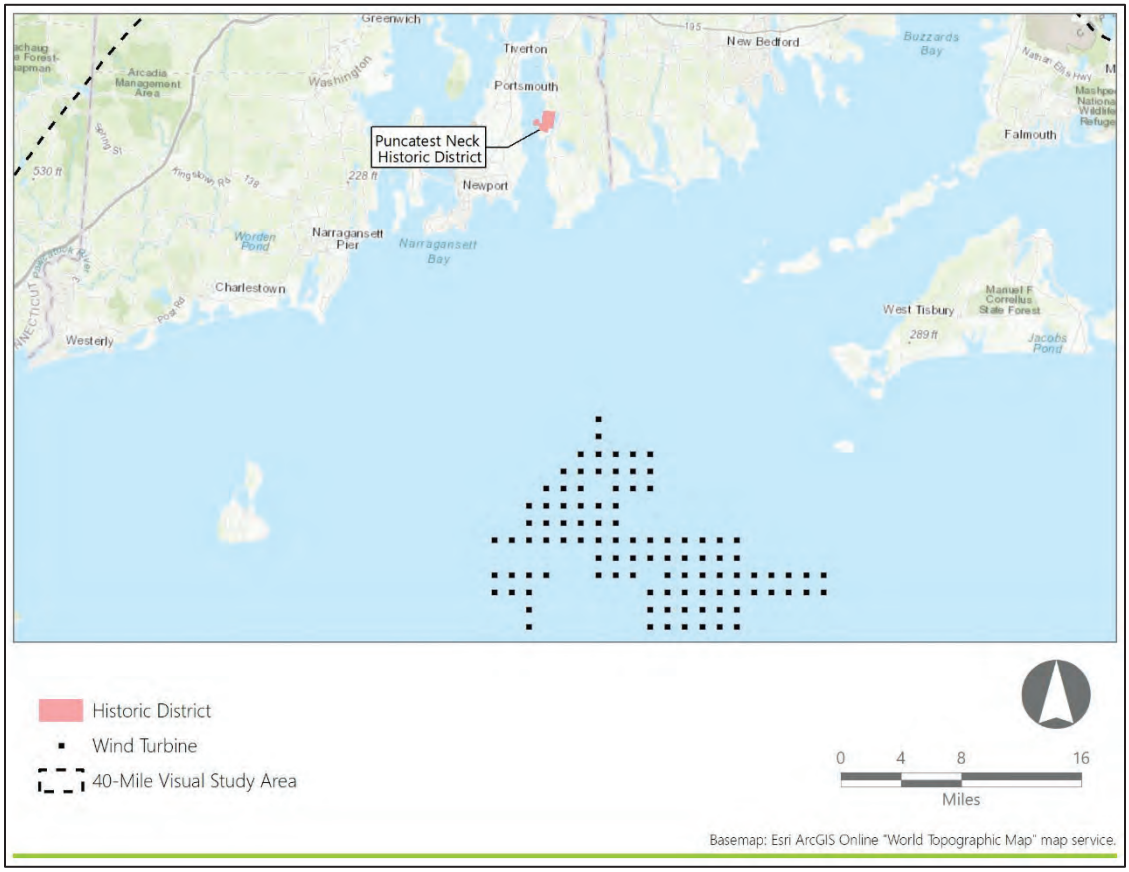
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (Federal Register, 2021). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of Tiverton
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

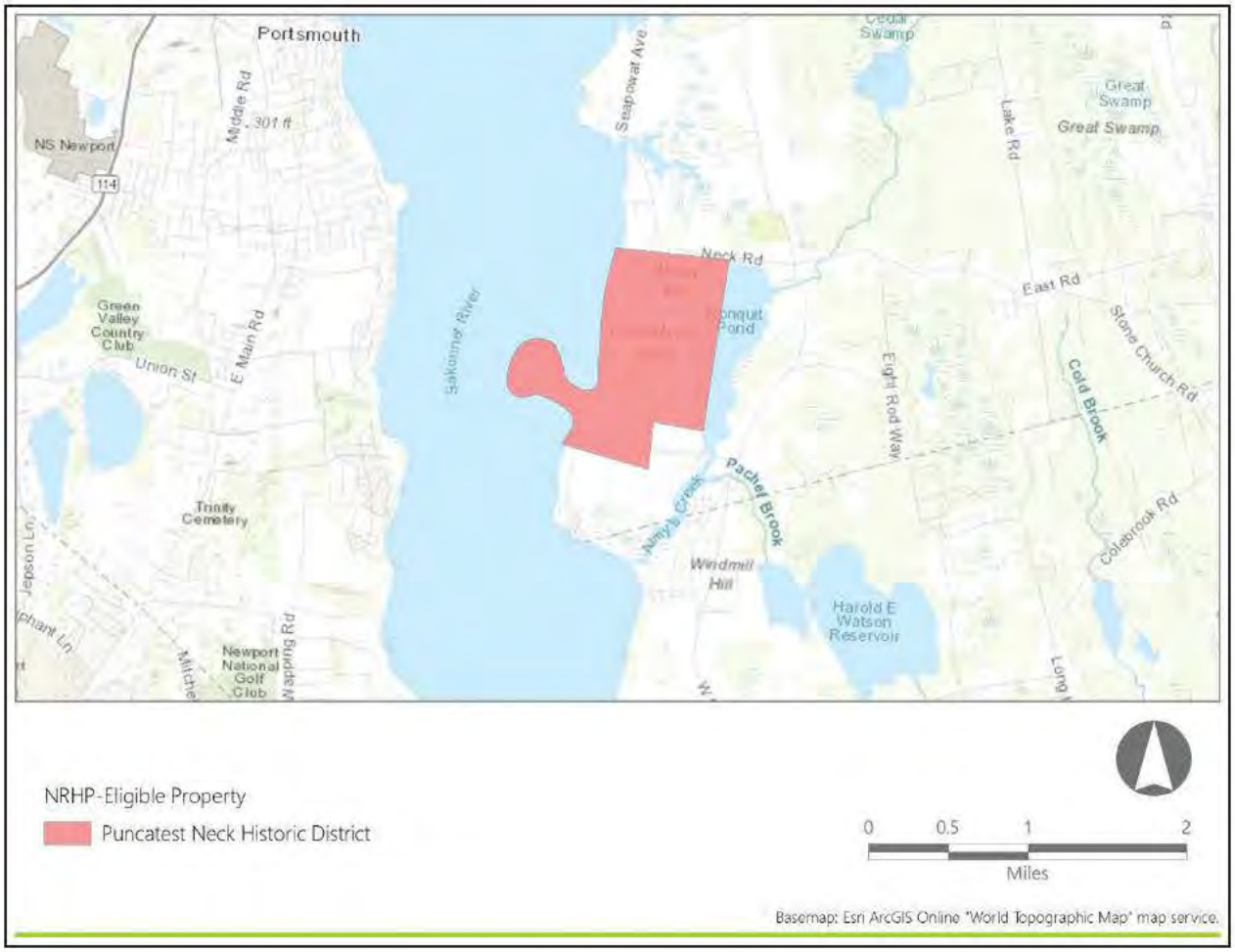
3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Property included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Puncatest Neck Historic District	RIHPHC Historic Resource	Tiverton	RI	234	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The Puncatest Neck Historic District is considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the Estates and Estate Complexes property type. These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

Historic seaside villages, ports and other districts in the study area are commonly characterized by dense development and narrow roadways. The maritime setting for such districts is often obvious and may be expressed through the design and orientation of homes, commercial properties and other buildings, parks, docks, piers, and breakwaters. Depending on the specific characteristics of each district, open ocean views may or may not be available from the majority of historic buildings and other areas within a village. Further, marine viewsheds may encompass limited areas due to the complexity of the shoreline and presence of points, necks, or islands that screen views towards the open ocean. Where ocean versus bay views are available but are tangential to the dominant aspects of maritime viewsheds, changes to those distant ocean views may not diminish the integrity of a seaside village or other historic district. Where ocean views are a dominant aspect of the maritime setting, changes to such viewsheds may diminish the integrity of a historic district, even where views are limited to immediate shoreline sections.

Maritime settings for historic piers, marinas, and related marine infrastructure are likely to include strong associations with specific harbors, coves, and bays where related activities were focused, and which exerted a significant influence on the design and construction of the historic infrastructure. The relationship of such local settings to ocean waters and the extent to which open ocean views represent an important element of a specific historic property's setting will vary depending on the orientation of the shoreline and the location of the historic property. The size and location of historic buildings and structures relative to each other and other elements of the surrounding environment may also be important to the overall integrity of historic maritime infrastructure.

3.3 Puncatest Neck Historic District

3.3.1 Physical Description and Existing Conditions

Puncatest Neck is located in the southwestern portion of Tiverton between Nonquit Pond and the Sakonnet River. The 1979 RIHPHC report entitled *Historic and Architectural Resources of Tiverton, Rhode Island: A Preliminary Report,* identified 18 resources within the potential historic district as well as a ferry landing site, three former wharves, and the King Philip's War Battle Site (RIHPHC, 1979). Of the 18 historic homes identified, it appears 17 are extant. The district runs along Puncatest Neck Road with the northern boundary approximately where Puncatest Neck Road takes a sharp, ninety-degree turn, to the southern end of the road, and along Fogland Road and includes Fogland Point.

While many of the properties have additions, seventeen of the residences appear to retain the integrity and significance to be eligible for listing on the NRHP. One of which, the Cook-Bateman Farm, is individually listed on the NRHP and one, the William Almy Farm/Fogland Farm/Puncatessett at 435 Puncatest Neck Road has been demolished. The former sites of the wharves, ferry land and the King Philip's War Battle Site would also be contributing resources to this historic district. The contributing resources are as follows:

- Cook Almy House – 58 Fogland Road
- Almy House – 103 Fogland Road
- John Almy House – 148 Fogland Road
- Former Site of Almy's Ferry Landing – Fogland Point
- Former Site of Almy's Wharf – Fogland Road
- Captain Gideon Wilcos House – 425 Puncatest Neck Road
- A. Wilcoc House – 481 Puncatest Neck Road
- Captain Fernando Wilcox House – 488 Puncatest Neck Road
- Peleg Cory House – 531 Puncatest Neck Road
- J. Piece House – 532 Puncatest Neck Road
- Captain George Gray House – 560 Puncatest Neck Road
- Isaac G. White House – 563 Puncatest Neck Road
- Robert Gray House – 630 Puncatest Neck Road
- Stephen Grinnell House – 677 Puncatest Neck Road
- Otis Almy House/Heathersfield – 737 Puncatest Neck Road
- Horace Almy House/Nanquit Farm – 807 Puncatest Neck Road

- Samuel E. Almy House – 494 Puncatest Neck Road
- Cook-Bateman Farm – 958 Puncatest Neck Road
- Ferol Bink Farm – 993 Puncatest Neck Road
- King Philip's Battle Site– Fogland Road
- Cory's Wharf/White's Wharf – Fogland Point
- Pierce's Wharf – Fogland Point

3.3.2 Historic Context

In 1659, Puncatest Neck was granted to 75 freeman of Plymouth Colony and 36 lots were defined, although no "substantial structures" were built. On July 8, 1675, one of the battles of King Philip's War was fought on Puncatest Neck. The first known structures were constructed around 1680 by the Church and Almy families. During the seventeenth and eighteenth centuries, Puncatest Neck was primarily agricultural. In the early eighteenth century a ferry was established on Fogland Point connecting Tiverton to Dartmouth and Newport and in the early nineteenth century the first wharf was established, shifting the economy of Puncatest Neck toward maritime related industries including fishing, oystering, and whaling. The wharf was expanded circa 1863 and in 1870 a second wharf was constructed. As industry increased, new residences were constructed, both modest and more opulent and in the late nineteenth century and through the twentieth century, additional residences were constructed to be used as summer residences (RIHPHC, 1979).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Puncatest Neck Historic District is eligible for listing under Criterion A for its association with the history of Tiverton, including farming, maritime, and summer colony development as well as the architecture of the contributing resources.

Similar to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Tiverton particularly on Puncatest Neck and Nannaquaket Neck (RIHPHC, 1979). These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. As stated above, Puncatest Neck is located between Nonquit Pond to the east and Sakonnet River to the east and Nannaquaket Pond is located on the eastern side of Nannaquaket Neck and the Sakonnet River is located to the west.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Context for Summer Cottage/Resort Development

4.1.1 Purpose and Intended Outcome

Similar to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Tiverton particularly on Puncatest Neck and Nannaquaket Neck (RIHPHC, 1979). These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;

- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.1.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. The proposed mitigation measures were developed by Revolution Wind. As part of the development of this HPTP, Revolution Wind anticipates conducting targeted outreach with the Participating Parties identified in Section 2.3.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 23 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: EIGHT HISTORIC PROPERTIES, TOWN OF NARRAGANSETT, WASHINGTON COUNTY, RHODE ISLAND

[Insert ATTACHMENT 23 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Eight Historic Properties

Town of Narragansett, Washington County, Rhode Island

Submitted to:



Bureau of Ocean Energy Management
U.S. Department of the Interior
Prepared for:



Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:



Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Dunmere The Ocean Road Historic District The Towers Historic District The Towers The Life Saving Station at Narragansett Pier Fort Varnum/Camp Varnum Narragansett Pier MRA The Dunes Club
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MOA	Memorandum of Agreement
NEPA	National Environmental Policy
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
OCS	Outer Continental Shelf
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation and Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Towers Historic District, which is listed on the National Register of Historic Places (NRHP); the Towers, which is listed on the NRHP; the Life Saving Station at Narragansett Pier, which is listed on the NRHP; Dunmere, which is listed on the NRHP; the Ocean Road Historic District, which is listed on the NRHP; Fort Varnum/Camp Varnum, which has been determined to be eligible for listing on the NRHP by the Rhode Island Historical Preservation & Heritage Commission (RIHPHC); Narragansett Pier MRA, which is listed on the NRHP; and the Dunes Club, which is listed on the NRHP (hereinafter, the Historic Properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
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- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder

engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

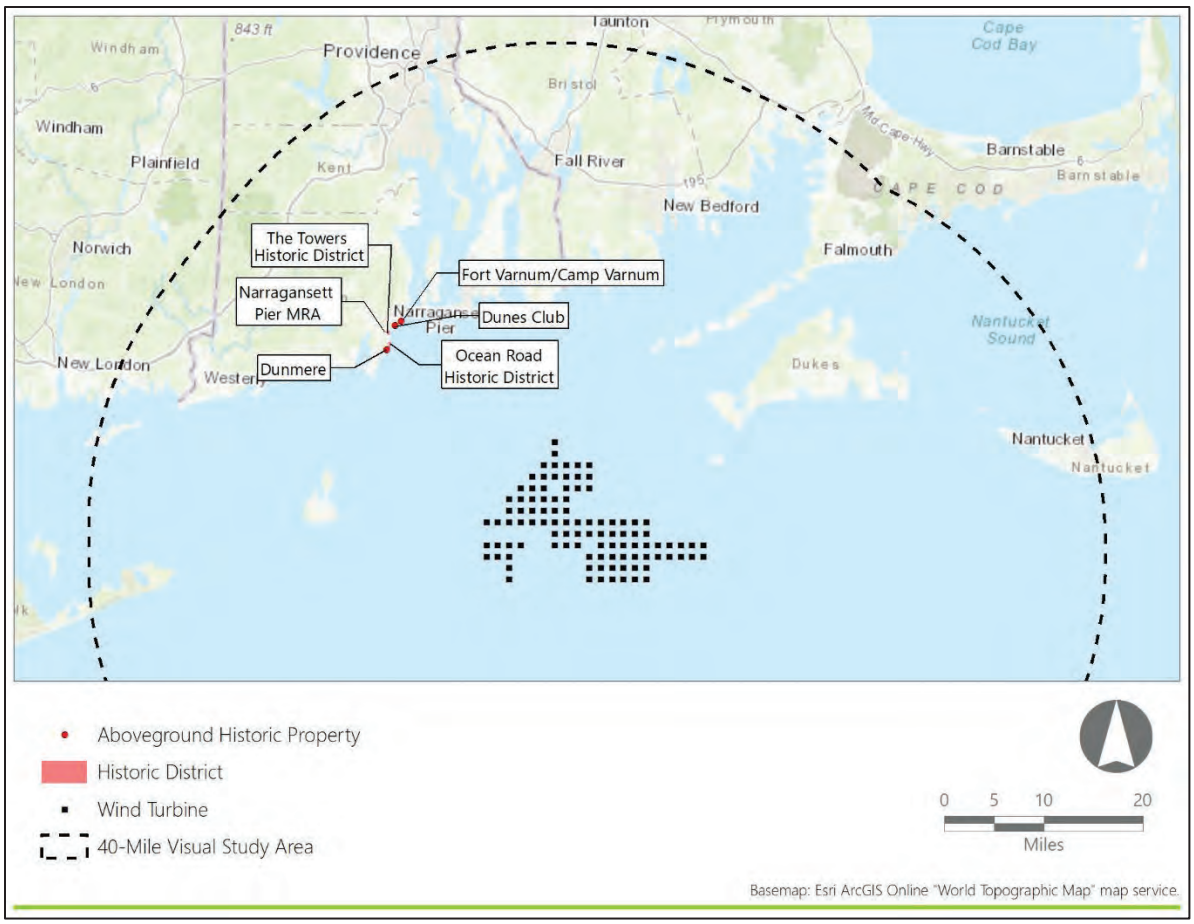
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location Map



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. Any mitigation work associated with the historic properties will comply with the conditions of all extant historic preservation easements. The RIHPHC holds a Historic Preservation Easement on the Towers, which is a contributing resource to the Towers Historic District. Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of Narragansett
- The Narragansett Historic District Commission
- The Narragansett Historical Society
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

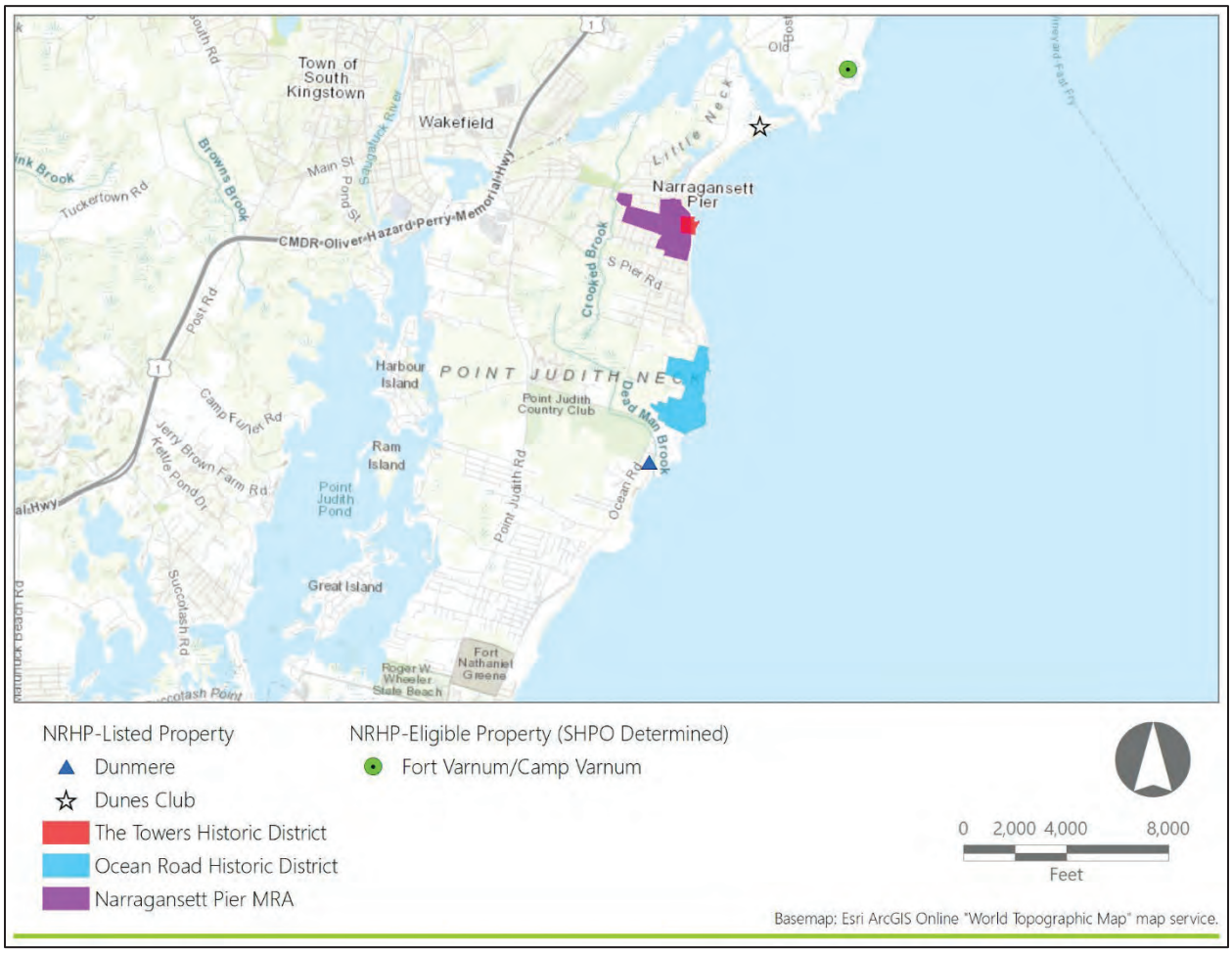
3.1 Historic Properties

This HPTP involves seven historic properties, as identified in Table 3.1-1 and located on Figures 3.1-1 and 3.1-2.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Dunmere	NRHP-Listed	Narragansett	RI	05001061 (NRHP)	Private	Estates and Estate Complexes
Ocean Road Historic District	NRHP-Listed			82000019 (NRHP)	Private	Recreational Properties
Towers Historic District	NRHP-Listed			82000021 (NRHP)	Private; Public	Recreational Properties
The Towers	NRHP-Listed			69000001	Private	Recreational Properties
Life Saving Station at Narragansett Pier	NRHP-Listed			76000010 (NRHP)	Private	Maritime Safety and Defense Facilities
Fort Varnum/Camp Varnum	RIHPHC Historic Resource			N/A	Federal	Maritime Safety and Defense Facilities
Narragansett Pier MRA	NRHP-Listed			64000753 (NRHP)	Private	Recreational Properties
Dunes Club	NRHP-Listed			15000243 (NRHP)	Private	Recreational Properties

Figure 3.1-1. Historic Property Location Map



In Sections 3.3. through 3.9, each resource is individually considered, described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Maritime Safety and Defense Facilities," "Lighthouses and Navigational Aids," "Recreational Properties," and "Estates and Estate Complexes." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Maritime Safety and Defense Facilities" consists entirely of facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense. These structures vary in their design and construction materials but are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense.

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of know hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequent located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made.

"Lighthouses and Navigational Aids" is defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Estates and Estate Complexes" consists of high-style residences, or groupings of residences, typically designed by prominent architects of the nineteenth and early twentieth centuries, such as Richard Morris Hunt and McKim, Mead and White. This property type consists mainly of the mansions and summer

"cottages" built by wealthy industrialist families, drawn to the vicinity of Newport, Rhode Island as it became a prominent vacation and recreation area for the emerging American elite, and to Montauk Point as a naturalistic and remote enclave.

Estates built by or for wealthy families have been part of the region's landscapes for centuries and many such properties are located along the shorelines. High style, architect-designed mansions and associated landscapes are characteristic of several areas within the study area and many such properties were sited to take advantage of ocean views. The importance of maritime settings to these properties may be apparent in the design of building features such as veranda, porches, and large windows facing the water or through landscape elements and overall designs that were intended to frame specific views towards the seas. As with many other historic property types, the conformation of local shorelines and the specific orientation of each property may be important in assessing the association with specific aspects or elements of each associated viewshed.

3.3 Dunmere

3.3.1 Physical Description and Existing Conditions

Dunmere, also known as Dunmere Gardener's Cottage, Gate, and Garden, is a 3.4-acre estate located at 560 Ocean Road in Narragansett, Rhode Island, approximately 600 feet from the coastline of Narragansett Bay. The property consists of the original Gardener's Cottage, entrance gate, and associated garden landscape. The Gardener's Cottage is a two-story building featuring granite masonry and wood construction. A three-story conical tower on the south elevation rises above the multi-gabled roof and a massive granite chimney rises from a central point in the roof. Fenestration is varied, with examples of Queen Anne and Eastlake-style windows, including single, fixed-pane and one-over-one, double-hung sash windows, some with colored geometric lights and delicate wood mullions and muntins (Youngken et al., 2005).

The entrance gate is of rough-cut granite construction and features an elliptical arch which appears to emerge from the natural rocky outcrops at the north side of the arch. A two-story conical tower on the south side of the arch features a small rectangular open window. A small, hipped roof projects from the base of the turret over a stone patio. The word "Dunmere" is legible within the design on a pair of decorative wrought-iron gates. Although much of the historic landscape has been removed or destroyed over time, the extant landscape architecture associated with the historic Dunmere estate include some garden terraces, fountains, a man-made pond, stone-arched bridge and stone retaining walls (Youngken et al., 2005).

3.3.2 Historic Context

The Dunmere estate was designed by John M. Merrick and constructed in 1883 for investor and financial pioneer Robert G. Dun. Dun began developing his estate after the expansion of Ocean Road and the growth of Narragansett as a recreational resort. Spanning over ten years, the construction at Dunmere included a three-and-one-half-story Queen Anne-style mansion on a rocky outcropping near the sea, a water tower, and a windmill. The landscape design was developed under the direction of the landscape architect Nathan Franklin Barrett, and eventually expended to encompass over 13 acres. The water tower was expanded and

renovated to become the present Gardener's Cottage. Several of the estate buildings, including the main house, have been lost over the years to fire and demolition, and the original estate boundaries have been subdivided (Youngken et al., 2005).

3.3.3 NRHP Criteria and the Maritime Visual Setting

Dunmere is listed on the NRHP and meets NRHP Criteria A and C for its associations with seasonal maritime recreation in late nineteenth-century New England and for its importance as an example of a seasonal estate complex with Gilded Age landscape design (Youngken et al., 2005). The location of the original mansion near the ocean speaks to the property's historic association with views to and enjoyment of the seascape. The historic properties have views of the open ocean to the east. The remaining buildings are significant due to their importance as elements of a late-nineteenth century seaside estate complex. Dunmere was listed in the NRHP in 2005.

3.4 The Ocean Road Historic District

3.4.1 Physical Description and Existing Conditions

The Ocean Road Historic District is an approximately 92-acre historic district located in Narragansett, Rhode Island, and includes 45 residences situated on portions of Ocean and Wildfield Farm Roads and Hazard and Newton Avenues. This district consists of various examples of Shingle-style houses and estates situated along the coastline that exhibit a range of expressions of the style. Among the most striking examples of architecture within the district is the unique two-and-one-half-story stone Hazard Castle with a 105-foot-tall tower, the Suwanee Villa Carriage House designed by James H. Taft with its conical tower, and the Colonial Revival-style Rose Lea designed by Willard Kent (Roise, 1981).

3.4.2 Historic Context

The history of the Ocean Road Historic District began with the acquisition of the land now encompassing the district boundaries by Joseph P. Hazard. Hazard's initial construction efforts included the Hazard Castle, which took nearly 40 years to complete, but which influenced the style and setting of the surrounding area. Based on Hazard's interpretation of English castles and informed by his spiritualist beliefs, Hazard Castle became the touchstone from which the eclectic slant of the Shingle style was expressed through subsequent development of the seaside resort town. In addition, Hazard began planting trees along the bluffs, ancestors of the trees that make up the wooded area in and around the district today. In addition, many of the residences were designed by prominent architects of the late nineteenth century, such as McKim, Mead, and White, and William Gibbons (Roise, 1981). The district was listed in the NRHP in 1982.

3.4.3 NRHP Criteria and the Maritime Visual Setting

The NRHP-listed Ocean Road Historic District meets Criterion C for high-style seasonal residences of the wealthy and famous of the Gilded Age. Most of the contributing properties "stand on dramatic sites overlooking the rocky shoreline and are oriented to the ocean" (NPS, 1982). The district also meets NRHP Criterion A for its association with the maritime resort community that developed around Narragansett Pier.

Situated along the coastline, its relationship to the water is central to the significance of the district. Many of the contributing properties within the district enjoy expansive views of the Atlantic Ocean and were sited to take advantage of those vistas.

3.5 The Towers Historic District

3.5.1 Physical Description and Existing Conditions

The Towers Historic District is an approximately 10-acre district bounded by Exchange Place, Mathewson Street, Taylor Street, and the Atlantic Ocean in the unincorporated village of Narragansett Pier. The district is comprised of 13 contributing resources including the Towers, the Life Saving Station at Narragansett Pier, a town park, and 10 private residences. Additionally, there is one non-contributing resource within the district, a residence built circa 2006 (Town of Narragansett, 2022).

The Towers and the Life Saving Station at Narragansett Pier are described in Sections 3.3.1 and 3.4.1, respectively. Both are substantial Romanesque Revival-style stone buildings. The Towers span Ocean Road, while the Life Saving Station is sited between Ocean Road and the Atlantic Ocean. North and west of the Towers, Memorial Park occupies approximately 1.6 acres. It consists primarily of open lawn, with a memorial fountain set within a paved plaza at the northeast corner and a group of war memorial monuments at the northwest corner (Roise, 1981).

The remaining contributing resources within the district are residences constructed between circa 1822 and 1900 in popular nineteenth-century styles including the Federal, Italianate, Second Empire, Colonial Revival, and Shingle styles. All of the residences feature wood clapboard or shingle siding and retain a generally high degree of integrity. Three of the residences are sited on Ocean Road facing east to the Atlantic Ocean (Roise, 1981).

3.5.2 Historic Context

The Town of Narragansett is named for the Narragansett Indian Tribe, the indigenous people of Rhode Island. The town was primarily agricultural in character from the late seventeenth century through the mid-nineteenth century (RIHPHC, 1991). Piers and wharves constructed along the shore during this time contributed to a diversified economy based on fishing, shipbuilding, and the export of agricultural products. A pier built in the late eighteenth century near the present site of the Towers gave the village of Narragansett Pier its name. One of the contributing resources within the Towers Historic District, the residence at 16 Mathewson Street, was built during this period, circa 1822 (Roise, 1981).

The transformation of Narragansett Pier from a working port village to a tourist destination began in the 1840s, when the first visitors began to spend the summer season as boarders in private homes. The village's first hotel was built in 1856 and by 1871 ten additional hotels were built to serve guests from throughout the Northeast, Mid-Atlantic, and Midwest. The construction of private summer residences and rental cottages soon followed, and Narragansett Pier became a fashionable resort town popular with businesspeople, industrialists, and members of the professional class. The residences within the Towers

Historic District were primarily built during this period, as either private residences or rental properties. The Narragansett Casino and the Life Saving Station at Narragansett Pier were both designed by McKim, Mead and White, and constructed in the 1880s (Roise, 1981; RIHPHC, 1991).

In 1900 a catastrophic fire destroyed most of the Narragansett Casino, along with the Rockingham Hotel and neighboring commercial buildings. Several of the large nineteenth-century hotels also burned in the early decades of the twentieth century. During this period, Narragansett Pier's tourism economy began to shift away from long-term renters towards day-trippers and short-term guests. Other physical changes included damage or destruction of many buildings in the area by hurricanes in 1938, 1954, and 1991. In the post-World War II era, the year-round population of the village and town increased, further altering the Pier's character as a seasonal resort community. Urban renewal activity in the 1970s resulted in the clearance of nineteenth-century buildings from a 28-acre area northwest of the Towers Historic District. The site of the former Narragansett Hotel was purchased by the Town of Narragansett in 1931 and developed as Memorial Park (Roise, 1981; RIHPHC, 1991). The Towers Historic District was listed in the NRHP in 1982.

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Towers Historic District meets National Register Criteria A and C for its relationship to the development of seaside tourism in Narragansett Pier and as a collection of intact nineteenth-century buildings which directly relate to tourism and maritime activity. The district's period of significance is 1850 to 1924 (Roise, 1981). The district as a whole derives historic significance from its seaside location and maritime visual setting. The siting of the Towers and several of the district's residences, in particular, provide expansive views of the ocean, while the Life Saving Station at Narragansett Pier was sited especially close to the ocean in order to facilitate the launch of lifeboats.

3.6 The Towers

3.6.1 Physical Description and Existing Conditions

The Towers is a multistory stone building with a roughly I-shaped plan formed by two pairs of engaged round towers connected by a massive east-west segmental arch spanning Ocean Road. The building has a steeply pitched main gable roof with multiple dormers while the towers have conical dormered roofs. A wing to the west has dormered hipped roofs. The exterior is of rock faced granite and the roofs are clad in wood shingles. Windows are primarily six-over-one or nine-over-one double hung sash. Primary entrances to the east and west tower sections are located within arched openings below the main arched volume. A small octagonal cupola and lantern are located at the center of the main gable roof. The Towers currently serves as a public event venue and is owned by the Town of Narragansett (Roise 1981; RIHPHC, 1991).

3.6.2 Historic Context

The village of Narragansett Pier was a leading seaside resort town during the last quarter of the nineteenth century. Several grand hotels and numerous private residences and rental cottages were constructed during this period. The Narragansett Casino was built between 1883 and 1886, serving as the center of social activity during the summer season. The rambling casino was designed by McKim, Mead & White, the

nationally prominent firm that had designed the Newport Casino just a few years earlier. The stone Towers served as a grand entrance linking the casino to the shore over Ocean Road, while the bulk of the building, consisting of guest rooms, card rooms, and dining rooms, was built of wood. A massive fire on September 12, 1900, destroyed the wood portions of the casino, including the roofs of the Towers, leaving only the stone portions of the Towers standing. The roofs of the Towers were subsequently rebuilt, and the building was acquired by the Town of Narragansett and renovated for use as a town hall. The Towers was individually listed in the NRHP in 1969 and was included as a contributing resource to the Towers Historic District, listed in the NRHP in 1982. Today, the building is utilized as an event venue (Roise, 1981; RIHPHC, 1991). A major exterior and interior restoration was completed in 2017.

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Towers is an iconic building in the village of Narragansett Pier and is the sole remnant of the community's many Gilded Age hotels. The building meets National Register Criteria A and C for its relationship to the development of seaside tourism in Narragansett Pier, as a notable example of seaside recreational architecture in the Romanesque Revival style, and as the work of McKim, Mead & White. The Narragansett Casino's oceanfront location and orientation provide expansive ocean vistas. This maritime visual setting is a key component of the Towers' historic significance.

3.7 The Life Saving Station at Narragansett Pier

3.7.1 Physical Description and Existing Conditions

The Life Saving Station at Narragansett Pier, also known as the Coast Guard House, is a two-story stone building located about 50 feet from the Atlantic Ocean on the east side of Ocean Road. The north end of the building is semicircular in plan while the south end is rectangular. The exterior is of rock faced granite ashlar and the gable-conical roof is clad in asphalt shingle. Multiple additions to the north, east, and south, dating from the late twentieth and early-twenty-first centuries, are primarily constructed of wood. The west elevation of the main volume features Roman arch openings which continue along the apsidal north end of the building. A bas-relief sculpture of a ship anchor decorates the parapeted gable end of the south elevation. Three rectangular window openings on this elevation are now obscured by later additions (Jones, 1976).

3.7.2 Historic Context

The United States Life-Saving Service was founded in 1848 as a volunteer organization providing rescue services along the New England and Mid-Atlantic coast. Early lifesaving stations consisted of utilitarian structures housing lifeboats and other equipment, often located near dangerous shoals and rocks. The service was nationalized by Congress in 1871, and funding provided for full-time crews to staff lifesaving stations. Congress authorized the construction of two initial stations in Rhode Island in the early 1870s, one on Block Island and the other at Narragansett Pier. This first lifesaving station at Narragansett Pier was a wood structure completed by 1873 north of the public beach (Jones, 1976).

The current Life Saving Station was built in 1888. It was designed by the nationally prominent architecture firm of McKim, Mead & White, which had completed the neighboring Narragansett Casino two years prior. The form and materials of the Life Saving Station complemented those of the casino. The Life Saving Station's ground floor served as a boathouse and had a sloping floor which allowed lifeboats to be launched through the arched openings, while the second floor served as the living quarters for the life station crew (Jones, 1976).

The Life-Saving Service was merged with the Revenue Cutter Service in 1915 to become the United States Coast Guard, which began consolidating lifesaving stations in the 1920s. The Life Saving Station at Narragansett Pier, then known as the Coast Guard House, was closed in 1946. It was subsequently converted into a dining establishment and continues in that function today, having survived damage from Hurricane Carol in 1954 and Hurricane Bob in 1991, as well as a fire shortly before it was listed in the NRHP in 1976. It was included as a contributing resource to the Towers Historic District, listed in the NRHP in 1982 (Jones, 1976; Roise, 1981).

3.7.3 NRHP Criteria and the Maritime Visual Setting

The Life Saving Station at Narragansett Pier meets National Register Criteria A and C for its association with the U.S. Life Saving Service and the early development of the U.S. Coast Guard, as a rare surviving example of a nineteenth-century lifesaving station, and as the work of McKim, Mead & White. The building's use as a boat launch necessitated its siting very close to the water on the ocean side of Ocean Road. This maritime visual setting is a key component of the Life Saving Station's historic significance.

3.8 Fort Varnum/Camp Varnum

3.8.1 Physical Description and Existing Conditions

Fort Varnum/Camp Varnum is currently an Army National Guard training facility located off Cormorant Road on Cormorant Point in Narragansett overlooking Narragansett Bay and the Atlantic Ocean. According to property records, the property currently consists of over 41 acres. Per review of aerial mapping, there are currently approximately 25 buildings on the property, the majority of which were constructed prior to 1963.

3.8.2 Historic Context

Fort Varnum/Camp Varnum was established in 1942 at the beginning of World War II as part of the United States military defense of Narragansett Bay. The fort was built to protect the west passage of Narragansett Bay and named after Revolutionary War Brigadier General James Mitchell Varnum (Sevigny, 2012). The original fort consisted of barracks, a mess hall, classrooms, and fire control towers, as well as other buildings (RIHPHC, 1991). The fort was transferred to the Rhode Island National Guard in 1957 and renamed Camp Varnum (Sevigny, 2012).

3.8.3 NRHP Criteria and the Maritime Visual Setting

Fort Varnum/Camp Varnum was constructed to defend Narragansett Bay. Its location on the coast with views of the Bay and the Atlantic Ocean were necessary for the army to defend the coast.

3.9 Narragansett Pier MRA

3.9.1 Physical Description and Existing Conditions

The Narragansett Pier MRA is located along the coastline of Narragansett Bay and the Atlantic Ocean and consists of residences, resort-related buildings, hotels, religious buildings, the Towers and other buildings dating from circa 1840 to the mid-twentieth century (Roise, 1978).

3.9.2 Historic Context

In the late nineteenth century, Narragansett, along with many other coastal New England towns, transformed from a predominately agricultural community to a summer destination. Hotels, summer cottages, and resorts were constructed along the shorelines for the upper-middle- and upper-class residents of nearby New York, Boston and Philadelphia. The first hotel, the Narragansett House was built in 1856 and by 1871, ten hotels existed at the Pier (RIHPHC, 1991). The Narragansett Casino was designed by McKim, Mead, and White and was constructed between 1883 and 1860. A fire destroyed the complex and other buildings in the vicinity in 1900, leaving only the Towers.

3.9.3 NRHP Criteria and the Maritime Visual Setting

The Narragansett Pier MRA is significant under Criterion A for its association with the transformation of Narragansett from a rural, farming community to a summer resort as well as under Criterion C for its architecture. Many buildings within the MRA were designed by some of the most prominent architects of the time in a variety of styles including Italianate, Second Empire, Stick, Shingle, Queen Anne and Second Empire (Roise, 1978).

The MRA's location along Narragansett Bay as well as its history and existence as a summer resort colony are intrinsic to its maritime setting. Buildings were sited on the water or to have views of the water and were designed for people wanting to escape the heat of the city and be on the water. The most architecturally significant properties are located on the coast, including the Towers and the Life Saving Station.

3.10 The Dunes Club

3.10.1 Physical Description and Existing Conditions

The Dunes Club is addressed as 137 Boston Neck Road. The property is located on 32.16 acres on Little Neck, off Boston Neck Road, on Beach Street, between the road, of Narragansett Bay and the Atlantic Ocean, and the Pettaquamscutt River, also known as the Narrow River (Town of Narragansett, 2022).

There are six resources that contribute to the Dunes Club, the property also has seven noncontributing buildings and structures. The clubhouse is a one-and-a-half-story building with a lantern cupola constructed in 1939 in the colonial revival style. Connected by a wood deck to the east of the clubhouse are a pool constructed in 1928 and one-story bathhouses constructed in 1939. Further east are three U-shaped cabana buildings constructed in 1939. A one-story, gable-roofed staff house constructed in 1939 is located to the north of the clubhouse. The staff house complex is four buildings connected around a central courtyard. The gatehouse is located at the entrance of the property at the intersection of Beach Street and Boston Neck Road. The gatehouse is a hipped-roof turreted building constructed in 1928. All of the buildings, except the gatehouse, have sustained damage in multiple hurricanes and have had alterations and/or partial reconstructions (Youngken, 2015).

3.10.2 Historic Context

With the ease of travel by train and ferry, during the mid-to-late nineteenth century, wealthy families from New York, Philadelphia, and Boston began frequenting the southern New England coast in the summer to get away from the heat of the cities. Resort hotels and summer homes were constructed, and summer colonies and resorts were developed.

In the 1920s the Dunes Club was founded by wealthy summer residents of Narragansett to establish a private club after the casino was destroyed by fire in 1900. The original Dunes Club was constructed between 1928 and 1929. Kenneth Murchison, Jr., an architect from New York, was the original architect and designed the club in the Mediterranean Revival style, which was the popular style for these types of clubs at the time (North Carolina Architects and Builders, 2022; RIHPHC. 1991). The complex was destroyed in the hurricane of 1938, and only the gatehouse and pool remain from the original club (Youngken, 2015).

In 1938-1939 the Dunes Club was reconstructed. The new complex was designed by Thomas Pym Cope, an architect from Philadelphia. Cope designed the clubhouse, bathhouses, cabanas, and staff housing complex as part of the original plan for the club (Youngken, 2015).

3.10.3 NRHP Criteria and the Maritime Visual Setting

The Dunes Club is listed on the NRHP as an "excellent example of the private American beach club facility of the early-to-mid-20th century." The club is significant under Criterion A for its association with coastal Rhode Island, and in particular Narragansett, becoming a summer destination. The Dunes Club was established as a members-only club by summer residents from Philadelphia and New York. The Dunes Club is also significant under Criterion C for its architecture. As stated above, Thomas Pym Cope designed the original Dunes Club complex including the clubhouse, gatehouse, bathhouses, cabanas and staff housing complex (Youngken, 2015).

The Dunes Club located on Little Neck, between the Atlantic Ocean, and the Pettaquamscutt River. As a private beach club, this historic property has a clear maritime setting with access and views of Narragansett Bay and the Atlantic Ocean.

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Ocean Road Seawall Assessment

4.1.1 Purpose and Intended Outcome

This HPTP proposes to complete a study to determine an implementation plan to preserve the Ocean Road seawall. Per the *Town of Narragansett, RI Strategy for Reducing Risks from Natural Hazards in Narragansett, Rhode Island: A Multi-Hazard Strategy,* the Ocean Road Seawall "could be washed out during a storm" due to erosion, flooding and storm surge and there is threat of severe weather, storms, wind and flood damage (Town of Narragansett et al., 2013. The intended outcome is to provide funding to assess the Ocean Road seawall and prioritize repairs and improvements that would enhance protection of the Ocean Road Historic District and preserve the character of existing historic shoreline settings. This measure would also propose the incorporation of such measures in the Town's Hazard Mitigation Plan (Town of Narragansett et al., 2013).

4.1.2 Scope of Work

This work will consist of the following:

- Review existing planning and hazard mitigation documents, guidance. and regulations;
- Conduct a site assessment of current conditions along the seawall, including photographs and documentation of existing conditions;
- Develop a draft plan, including a repair methodology, a list of priorities, schedule/timeline, and accurate cost estimates;
- Distribute the draft plan to the Participating Parties for review and comment; and
- Develop a final plan to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. A qualified coastal engineer or comparable professional will make field observations along the Ocean Road seawall to be compiled and analyzed as part of the current conditions report. Based on the current conditions and in consideration of changing weather patterns and rising sea levels, recommendations for repairs and upgrades to the seawall

will be presented to the Town of Narragansett. These recommendations will include a detailed methodology, list of priorities, schedule/timeline and accurate cost estimates for all work. Subsequent to feedback from the Participating Parties, a draft report will be submitted to the Participating Parties for review and comment. A final plan will be developed incorporating the Participating Parties comments and will be distributed to the Participating Parties.

4.1.4 Standards

The project will comply with the following standards:

- Town of Narragansett Code of Ordinances Chapter No. 1081 *Buildings and Building Regulations* (Town of Narragansett, 2020).

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Photographs and documentation of existing conditions.
- Draft plan; and
- Final Plan.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 National Register of Historic Places Nomination for Fort Varnum/Camp Varnum

4.2.1 Purpose and Intended Outcome

The purpose of this mitigation measure is to officially document the history and significance of Fort Varnum/Camp Varnum and the role the property played in the defense of the eastern seaboard during World War II, as well as the role it continues to play in defense of the United States. As stated above, Fort Varnum/Camp Varnum was established in 1942 at the beginning of World War II as part of the United States military defense of Narragansett Bay. The fort was built to protect the west passage of Narragansett Bay and is just one of such military installations constructed during the time. The NRHP nomination will consider the history, need, and development of these facilities with an in-depth focus on this specific property.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Research of available historic sources and existing documentation;
- Field survey, annotated photographs, mapping, and conditions assessments;
- Drafting of a NRHP Nomination Form to be distributed to the Participating Parties for review and comment;
- Development of a final NRHP Nomination Form which addresses comments from the Participating Parties;
- Distribution of the final NRHP Nomination Form to the Participating Parties; and
- Presentation of the final NRHP Nomination Form to the State Historic Preservation Office Review Board.

4.2.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant selected will prepare a draft NRHP Nomination Form, prepared in accordance with applicable National Park Service and RIHPHC guidance. The draft document will include a description of the boundaries and property, a historic context and statement of significance, and all maps and photographs required by National Park Service (NPS) guidance. The draft NRHP Nomination Form will be distributed to the Participating Parties for review and comment. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties. The final document will be presented to the Rhode Island State Historic Preservation Office Review Board.

4.2.4 Standards

The project will comply with the following standards:

- The *Secretary of the Interior's Guidance on the Identification of Historic Properties* (36 CFR 800.4);
- The *Secretary of the Interior's Standards and Guidelines – Professional Qualifications Standards, for Archaeology, History, Architectural History and/or Architecture* (62 FR 33708);
- National Park Service's *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*;
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

4.2.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.3 Historic Context for Summer Cottage/Resort Development

4.3.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in Narragansett. These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.3.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;
- Identify and consult with relevant stakeholders and the Participating Parties;
- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.3.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.3.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.3.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.3.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Rhode Island Historic Properties, February 3, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 24 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE BLOCK ISLAND SOUTHEAST LIGHTHOUSE, NATIONAL HISTORIC LANDMARK, TOWN OF NEW SHOREHAM, WASHINGTON COUNTY, RHODE ISLAND

[Insert ATTACHMENT 24 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Block Island Southeast Lighthouse, National Historic Landmark
Town of New Shoreham, Washington County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Block Island Southeast Lighthouse, National Historic Landmark
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Block Island Southeast Lighthouse, which is a National Historic Landmark (the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic property.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic property (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

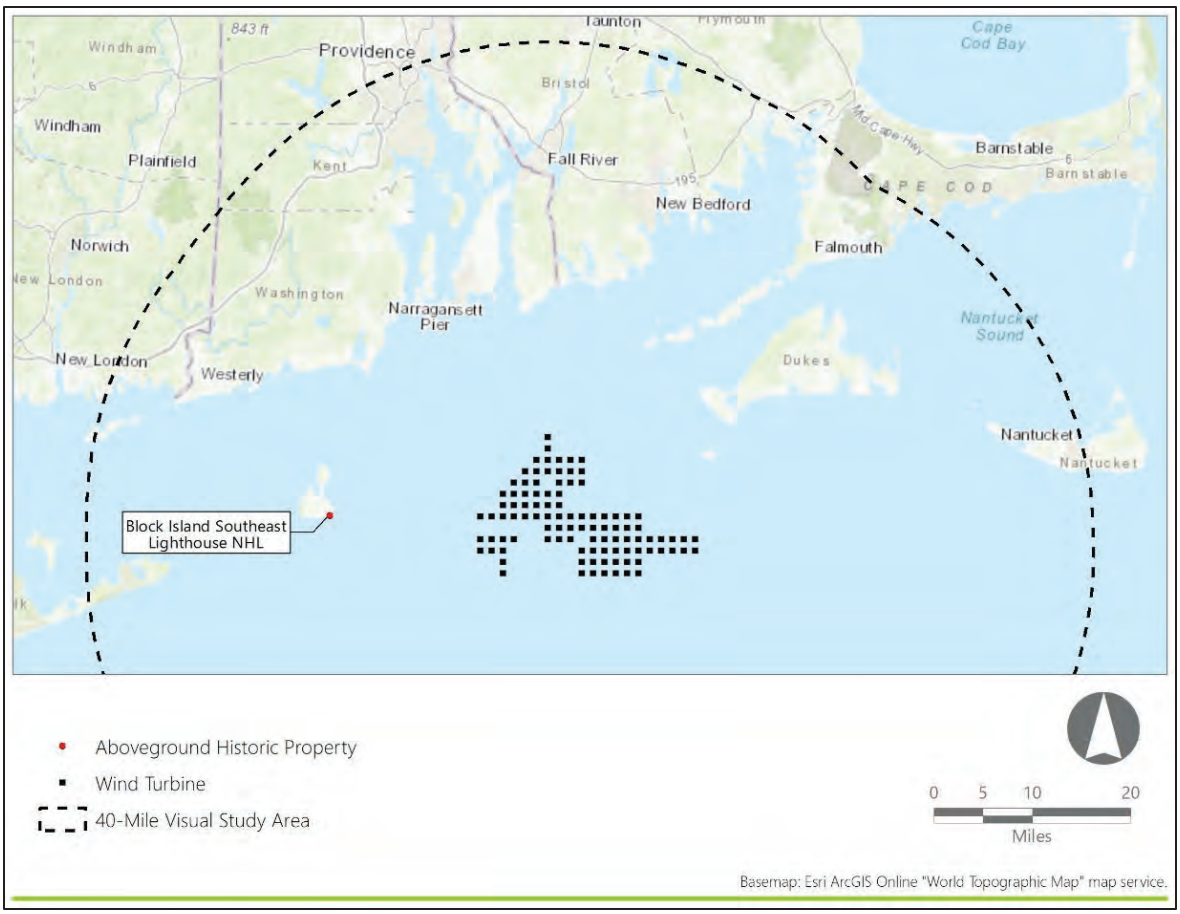
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHLs) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2 – Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. Any mitigation work associated with the historic property will comply with the conditions of all extant historic preservation easements. The Rhode Island Historical Preservation & Heritage Commission holds a Historic Preservation Easement and the United States Coast Guard holds a Aid to Navigation Easement on the historic property. Additional information regarding compliance with extant preservation restrictions appears below in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of New Shoreham
- The Southeast Lighthouse Foundation
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

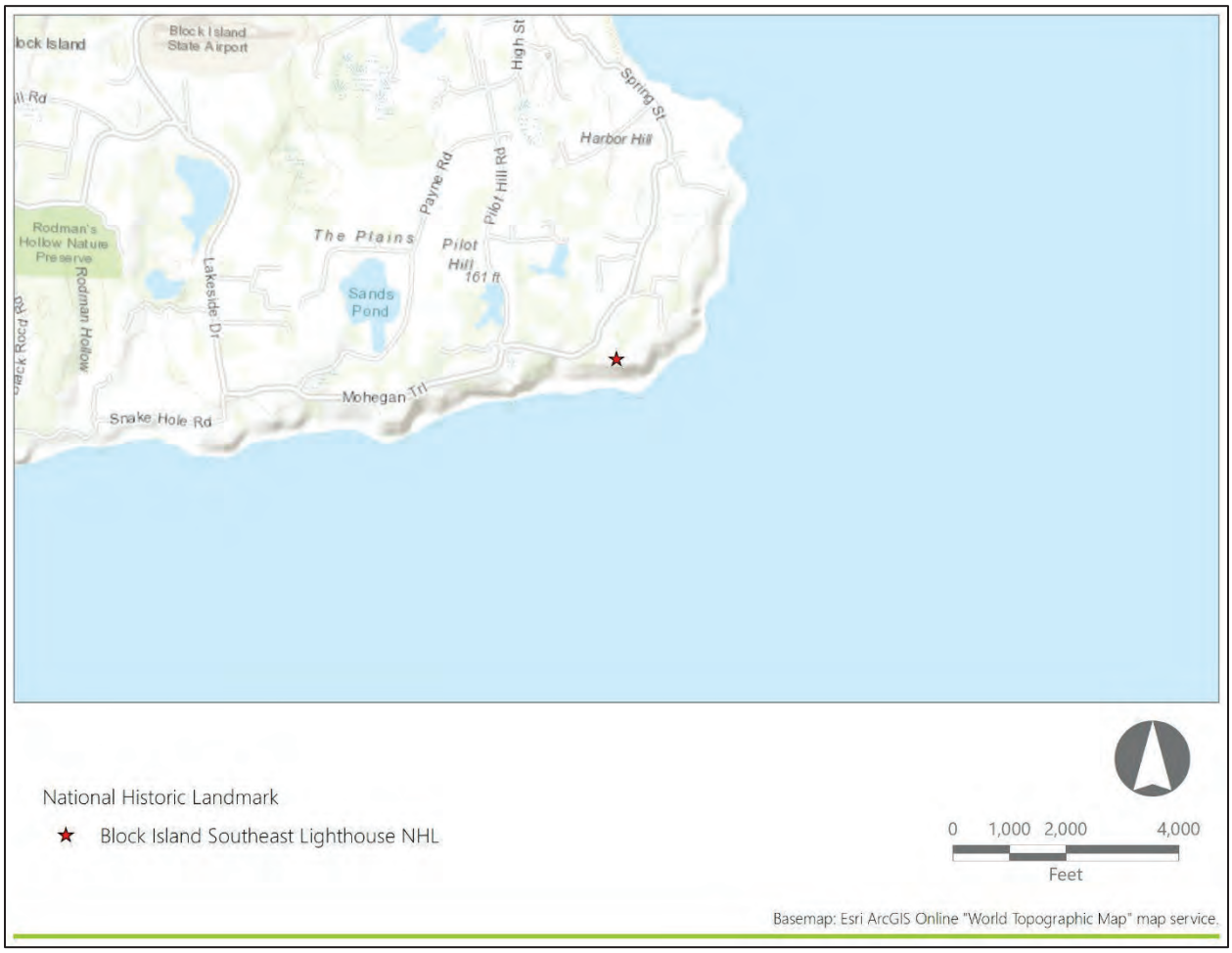
3.1 Historic Properties

This HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.11-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No.	Ownership	Historic Property Type
The Block Island Southeast Lighthouse, National Historic Landmark	National Historic Landmark	Town of New Shoreham	RI	90001131 (NRHP); 97001264 (NHL)	Southeast Lighthouse Foundation (Private)	Lighthouses and Navigational Aids

Figure 3.1-1. Historic Property Location



In Section 3.3, the historic property is considered, both physically and historically with a focus on the contribution of a maritime visual setting to the historic property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The Block Island Southeast Lighthouse, National Historic Landmark is identified in the HRVEA within the historic property type "Lighthouses and Navigational Aids" which is defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic

features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

3.3 The Block Island Southeast Lighthouse, National Historic Landmark

3.3.1 Physical Description and Existing Conditions

The Block Island Southeast Lighthouse, National Historic Landmark is located at 122 Mohegan Trail in the Town of New Shoreham, Rhode Island, on Mohegan Bluff, on the southeast shore of Block Island. Built in 1874 and fully operational by 1875, the Block Island Southeast Lighthouse, National Historic Landmark consists of a five-story, 67-foot-tall octagonal brick tower topped with a copper panel roof. Inside the gallery atop the masonry shaft is a sixteen-sided lantern. A two-and-one-half-story, brick duplex keeper's residence is connected to a one-and-one-half-story kitchen by a hyphen of the same height, both with asphalt shingled gable roofs. Both the tower and the keeper's residence feature granite foundations and trim. In addition, there are two non-contributing buildings on the Block Island Southeast Lighthouse, National Historic Landmark parcel which include a brick garage and Ranch-style house.

The Block Island Southeast Lighthouse, National Historic Landmark is currently set on an approximately 14-acre open parcel. The historic property is located at the end of a sand pedestrian path (Mohegan Trail) off of Spring Street. To the east and west of the buildings are areas of low vegetation, and to the south is the Atlantic Ocean. As the result of over 25 years of rehabilitation efforts, the historic fabric of the Block Island Southeast Lighthouse, National Historic Landmark is intact and well-preserved.

3.3.2 Historic Context

The Block Island Southeast Lighthouse, National Historic Landmark is a rare surviving example of a lighthouse built during a brief period of Victorian Gothic design influence at the U.S. Lighthouse Board and is the sole surviving lighthouse of its high-style design. It was constructed in 1874 by T. H. Tynan of Staten Island, NY and based on the High Victorian Gothic style promulgated by the U.S. Lighthouse Board at the time (Greenwood, 1984). A fixed, six-panel Fresnel lens manufactured in 1873 by Barbier and Fenestre of Paris was installed in the tower and was illuminated by a succession of different fuel sources as time and technology progressed. At the time of its construction, the Block Island Southeast Lighthouse, National Historic Landmark was one of the most advanced lighthouses in the country, both technologically and stylistically. It is noteworthy that the residents of Block Island warned that erosion of the bluffs could pose future hazards to the stability of the lighthouse even before construction began (Reynolds, 1995). The Block Island Southeast Lighthouse, National Historic Landmark a tourist destination owing to the dramatic setting on the bluff. The non-contributing brick garage was constructed in 1939, and a single-story Ranch-style

house was constructed by the USCG in 1962 (Reynolds, 1995). During World War Two, a radar tower was built next to the lighthouse and disguised as a water tower (Scofield and Adams, 2012).

Between 1874, when the Block Island Southeast Lighthouse, National Historic Landmark was originally constructed, to the late 1980s, nearly 250 feet of the coastal bluff had been lost to erosion. The USCG began monitoring the erosion of the bluff in the 1950s, and in 1983 local advocacy began in earnest. This resulted in the Block Island Southeast Lighthouse being listed as one of the National Trust for Historic Preservation's "America's Eleven Most Endangered Historic Places" in 1990 and 1991 (Reynolds, 1995). Under the supervision of the US Army Corps of Engineers the lighthouse structure and dwelling were moved approximately 360 feet back from the edge of the bluffs in 1993 (PAL, 2012). At that time the buildings were only approximately 55 feet away from the edge of the bluff. Hydraulic systems were utilized in the lifting and then the moving along metal racks of the nearly 2,000-ton structure. The light tower and dwelling were moved as a single mass, including the above-ground elements of the foundations, to retain the historic fabric. The new location preserves the historic relationship of the lighthouse with seacoast (Reynolds, 1995).

Following the relocation of the Block Island Southeast Lighthouse, National Historic Landmark in 1993, cliff erosion was no longer the biggest threat to the structure. The exterior of the Block Island Southeast Lighthouse has been rehabilitated significantly since its relocation. Rehabilitation efforts have included roof replacement, repointing of brick mortar, window restorations and improvements to the light tower's cast iron elements (SELF, 2021). Recently, interior spaces have been rehabilitated to provide space for a museum, which opened in the summer of 2021 (Block Island Times, 2021).
(Block Island Times, 2021).

3.3.3 NRHP/NHL Criteria and the Maritime Visual Setting

The Block Island Southeast Lighthouse, National Historic Landmark was listed on the NHRP in 1990. It is significant under Criterion A for its historic association with transportation. It is also significant under Criterion C as an outstanding example of High Style Victorian Gothic maritime architecture designed by the U.S. Lighthouse Board (Greenwood, 1990). The period of significance is 1874 with the original construction of the lighthouse to 1929 when the light was illuminated by electricity (Greenwood, 1990). The Block Island Southeast Lighthouse, National Historic Landmark was elevated to an NHL in 1997 under NHL Criterion 1 (Events) due to its strong associations with maritime navigation from its construction to today, and NHL Criterion 4 (Architecture) for its picturesque design and setting. The Block Island Southeast Lighthouse, National Historic Landmark also satisfies Criteria Exclusion 2 as a moved property, since the historic setting and characteristics for which it is significant were not substantively changed as the result of its being removed from the bluff (Reynolds, 1995).

The Block Island Southeast Lighthouse, National Historic Landmark was constructed on the southeast shore of New Shoreham to guide vessels around the dangerous shoals and ledges that surround the Block Island coast. The light is in many instances, the first light seen by vessels crossing the Atlantic Ocean (Greenwood, 1990). In 1929, in order to distinguish the lighthouse from others in the area, the light was replaced with a flashing green light (D'Entremont, 2021). The Block Island Southeast Lighthouse, National Historic Landmark's green light is the only in New England (Greenwood, 1990). Even after the lighthouse was moved inland from its original location, the lighthouse retains its significant maritime setting.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who met Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected, and the heightened significance and standard of care for the NHL. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Cyclical Maintenance Activities and Restoration

4.1.1 Purpose and Intended Outcome

The purpose of this HPTP is to provide funding for the implementation of cyclical maintenance and restoration activities as identified in the cyclical maintenance plan at the Block Island Southeast Lighthouse, National Historic Landmark. The activities of this mitigation measure will be completed in order of priority and may include window restoration and exterior brick repointing and restoration. The intended outcome of this measure is to perform activities to maintain the physical condition, character, and integrity and to ensure the long-term preservation of the Block Island Southeast Lighthouse, National Historic Landmark.

4.1.2 Scope of Work

The scope of work will be determined in consultation with the Participating Parties; however, common practice requires a trained, experienced professional, or team of professionals, to complete physical restoration according to the Secretary of the Interior's Standards for Rehabilitation to ensure the long-term preservation of the Block Island Southeast Lighthouse, National Historic Landmark. Existing conditions, including documentation and photography will be completed prior to any work commencing and as-built documentation and photography will be completed at the end of the project.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The chosen consultant should have a demonstrated knowledge of the treatment of historic properties. Existing conditions, including documentation and photography will be completed prior to any work commencing. All work completed must meet the Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties (36 CFR 68) and comply with the existing Preservation Restriction. Upon completion of any work, as-built documentation and photography will be completed and provided to the Participating Parties.

4.1.4 Standards

The project will comply with the following standards:

- The Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations;
- The Town of New Shoreham Historic District Commission;
- United States Coast Guard Aid to Navigation (ATON) Access Easement (U. S. Department of Homeland Security and U. S. Coast Guard, 2005);
- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- *Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings;*
- *National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation;*
- *Historic Lighthouse Preservation Handbook;*
- *IALA-AISM Lighthouse Conservation Manual;*
- Preservation Restriction (RIGL Title 42, Section 42-45-9); and
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68); and
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFP;
- Proposals by qualified consultants in response to the RFP;
- Existing conditions documentation including photographs;
- Draft plans and specifications, if applicable;
- Final plans and specifications, if applicable;
- As-built documentation, including photographs; and
- Other documentation, as required.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[2] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Southeast Lighthouse, National Historic Landmark, February 7, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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Applicant-Proposed Draft – Subject to Review and Comment by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Mill Creek Swamp #1 and #2 Sites, Town of North Kingstown, Washington County, Rhode Island

Submitted to:

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

EDR

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ATTACHMENT 25 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THIRTY-ONE HISTORIC PROPERTIES, TOWN OF NEW SHOREHAM, WASHINGTON COUNTY, RHODE ISLAND

[Insert ATTACHMENT 25 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Thirty-one Historic Properties

The Town of New Shoreham, Washington County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	Thirty-one Historic Properties in the Town of New Shoreham, Washington County, Rhode Island
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Regulation
HPTP	Historic Property Treatment Plan
MA SHPO	Massachusetts State Historic Preservation Officer
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service

NRHP	National Register of Historic Places
RFP	Request for Proposals
RI SHPO	Rhode Island State Historic Preservation Officer
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
SOI	Secretary of the Interior
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for 31 properties in New Shoreham (See Table 3.1-1, hereinafter, the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location and Old Harbor Historic District and New Shoreham Historic District Location Map

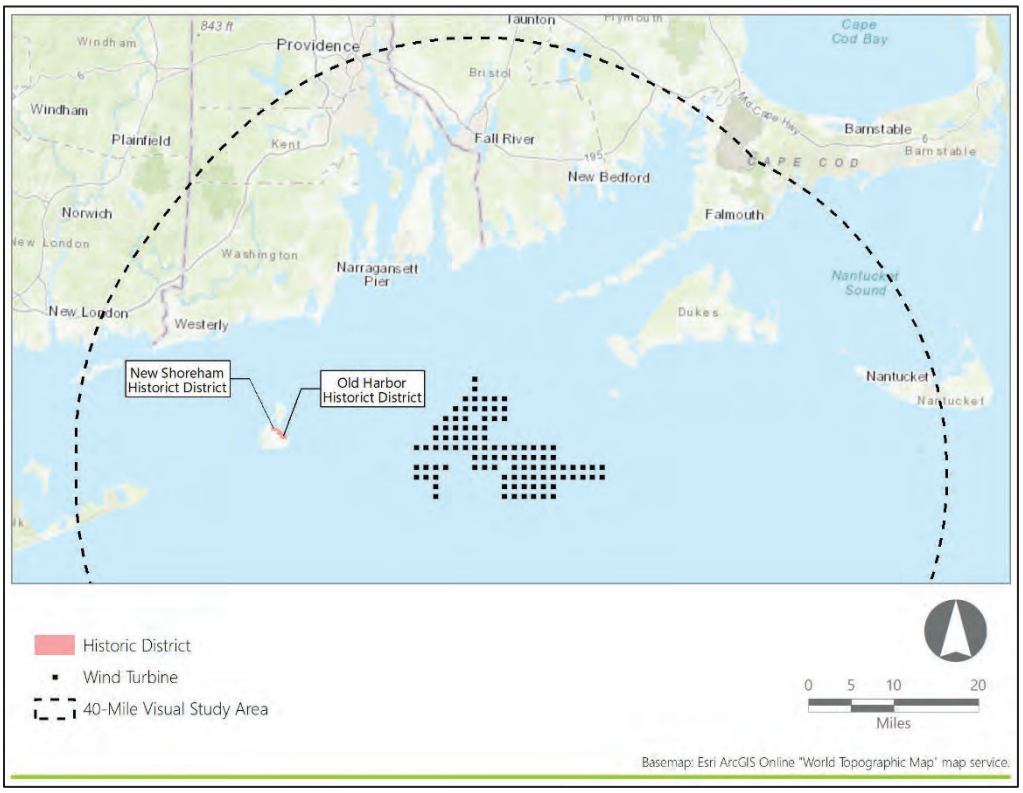


Figure 2.1-2. Project Location and Northern New Shoreham Location Map

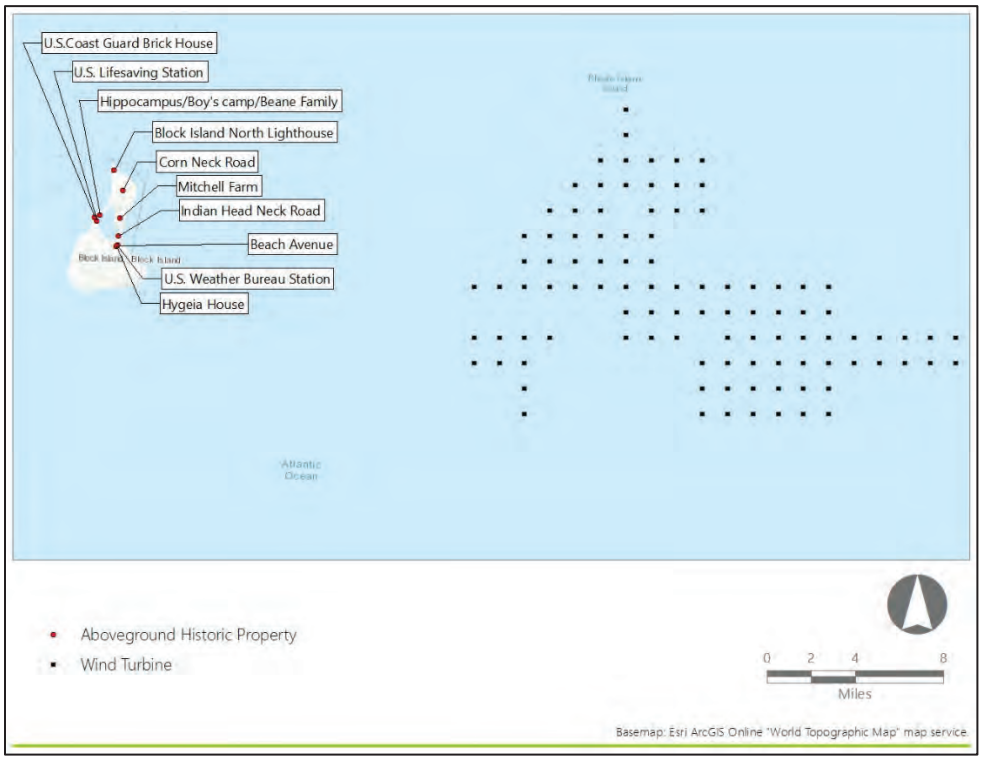


Figure 2.1-3. Project Location and Interior New Shoreham Location Map

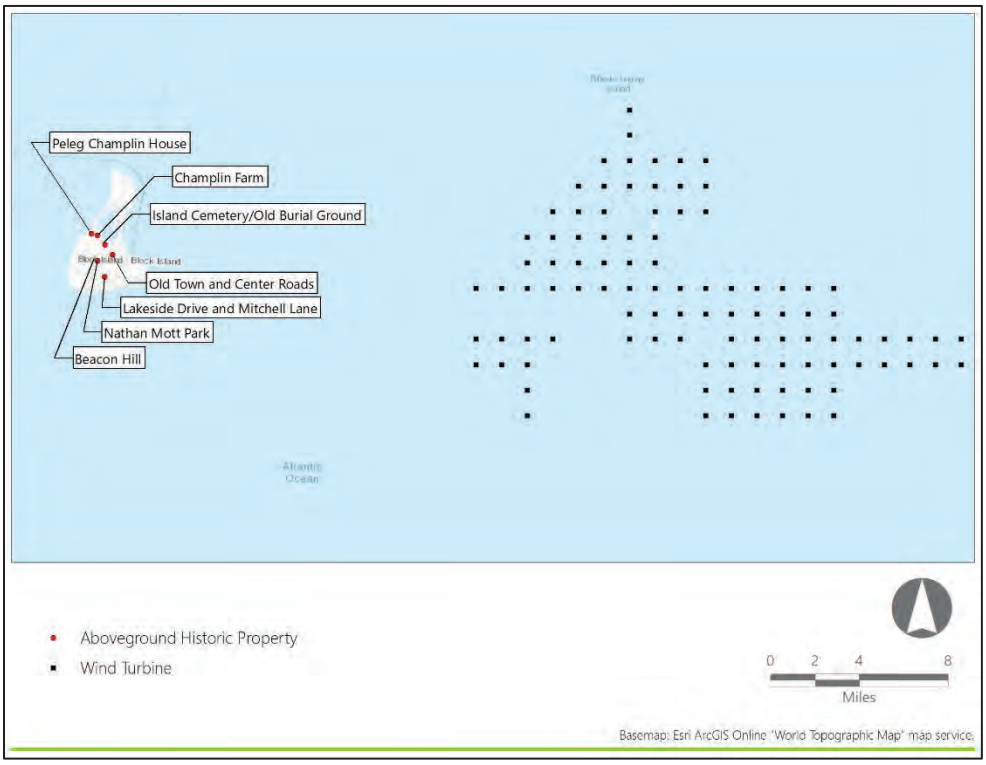


Figure 2.1-4. Project Location and Southern New Shoreham Location Map

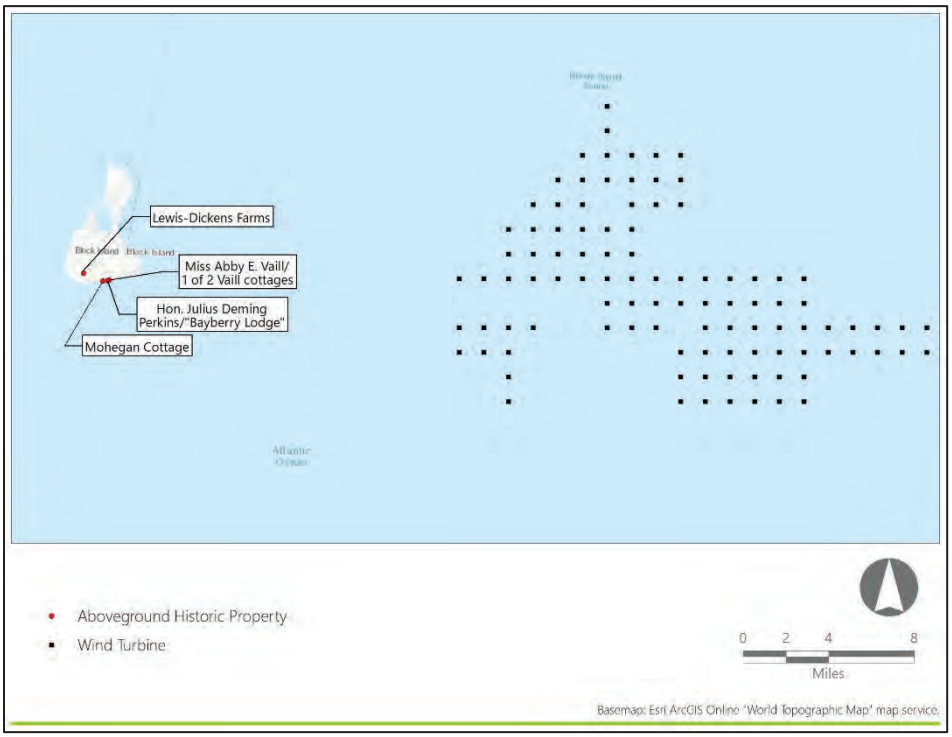
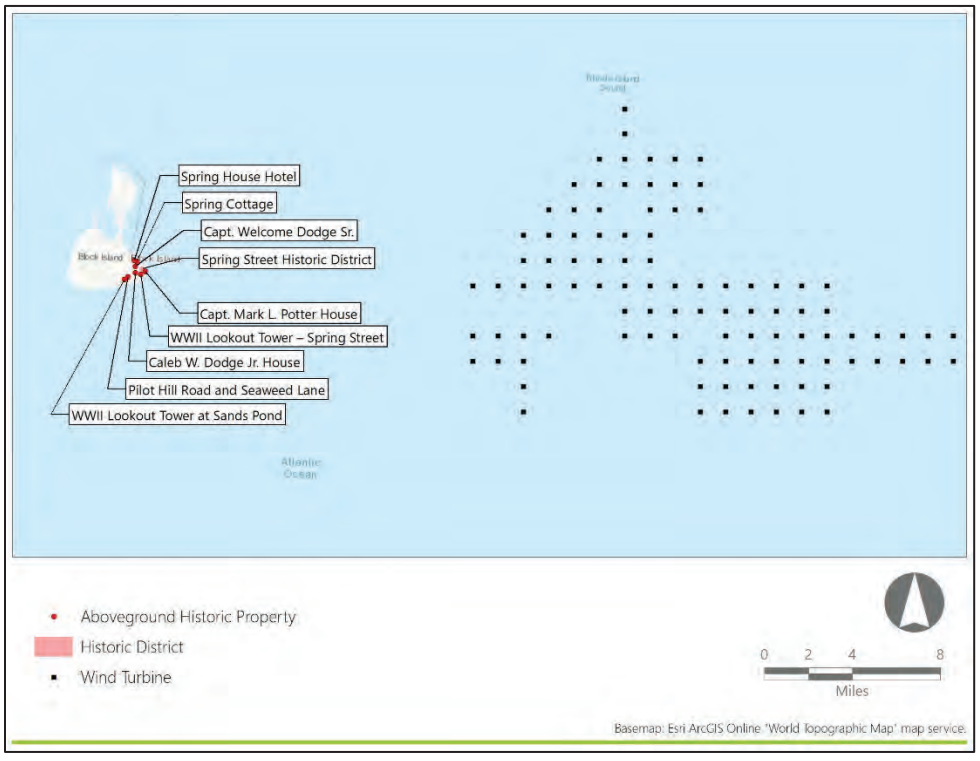


Figure 2.1-5. Project Location and Southeastern New Shoreham Location Map



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks (NHL) for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The MOA identifies certain preservation restrictions and easements applicable to specific properties in Stipulation III.C.1. The Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. Any mitigation work associated with the Historic Properties will comply with the conditions of all extant historic preservation easements. The Rhode Island Historical Preservation & Heritage Commission holds a Historic Preservation Easement on the Spring House Hotel. Additional information regarding compliance with extant preservation restrictions appears below in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic properties and invited the following parties:

- The Town of New Shoreham
- The Block Island Historical Society
- The U.S. Coast Guard
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves thirty-one historic properties, as identified in Table 3.1-1 and located Figures 3.1-1, 3.3-1, 3.4-1, 3.5-1, 3.6-1, and 3.7-1.[2]

Table 3.1-1. Historic Properties included in the HPTP[3]

Name	Property Designation	Site No. (Agency)	Geographic Context	Historic Property Type
The Old Harbor Historic District	NRHP-Listed	74000012 (NPS)	The Old Harbor Historic District	Historic Buildings and Structures
New Shoreham Historic District	Local Historic District	N/A	New Shoreham Historic District	Historic Buildings and Structures
The Corn Neck Road Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.B (RIHPHC)	Northern New Shoreham	Historic Buildings and Structures
The Indian Head Neck Road Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.D (RIHPHC)		Historic Buildings and Structures
The Hippocampus/Boy's Camp/Beane Family	NRHP-Eligible (RIHPHC Determined)	PAL.307 (RIHPHC)		Historic Buildings and Structures
The Mitchell Farm	NRHP-Eligible (RIHPHC Determined)	PAL.C (RIHPHC)		Historic Buildings and Structures
The U.S. Lifesaving Station	NRHP-Eligible (RIHPHC Determined)	PAL.39 (RIHPHC)		Maritime Safety and Defense Facilities
The U.S. Coast Guard Brick House	NRHP-Eligible (RIHPHC Determined)	PAL.305 (RIHPHC)		Maritime Safety and Defense Facilities
The U.S. Weather Bureau Station	NRHP-Listed	Ref 83000006 (NPS)		Historic Buildings and Structures
The Hygeia House	NRHP-Listed	Ref 1001156 (NPS)		Recreational Properties

[2] Note the Block Island Southeast Lighthouse, National Historic Landmark and the Block Island North Light are included in separate HPTPs.

Name	Property Designation	Site No. (Agency)	Geographic Context	Historic Property Type
The Peleg Champlin House	NRHP-Listed	Ref 82000016 (NPS)		Historic Buildings and Structures
The Beach Avenue Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.E (RIHPHC)		Historic Buildings and Structures
The Lakeside Drive and Mitchell Lane Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.J (RIHPHC)	Interior New Shoreham	Historic Buildings and Structures
The Nathan Mott Park	NRHP-Eligible (RIHPHC Determined)	PAL.237 (RIHPHC)		Recreational Properties
The Champlin Farm Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.296 (RIHPHC)		Agricultural Properties
Island Cemetery/Old Burial Ground	RI Historic Cemetery	BI 1		Historic Cemeteries and Burial Grounds
The Old Town and Center Roads Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.F (RIHPHC)		Historic Buildings and Structures
The Beacon Hill Road Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.M (RIHPHC)		Historic Buildings and Structures
The Mohegan Cottage	NRHP-Eligible (RIHPHC Determined)	PAL.169 (RIHPHC)	Southern New Shoreham/Mohegan Bluffs	Historic Buildings and Structures
The Lewis Farm and Dickens Farm Road Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.K (RIHPHC)		Agricultural Properties
The Miss Abby E. Vaill/1 of 2 Vaill Cottages	NRHP-Eligible (RIHPHC Determined)	PAL.131 (RIHPHC)		Recreational Properties
The Hon. Julius Deming Perkins/"Bayberry Lodge"	NRHP-Eligible (RIHPHC Determined)	PAL.130 (RIHPHC)		Recreational Properties
Spring Street Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.110 (RIHPHC)	Southeastern New Shoreham	Historic Buildings and Structures
The Caleb W. Dodge, Jr. House	NRHP-Eligible (RIHPHC Determined)	PAL.110 (RIHPHC)		Historic Buildings and Structures

Name	Property Designation	Site No. (Agency)	Geographic Context	Historic Property Type
The Captain Mark L. Potter House	NRHP-Eligible (BOEM Determined)	GAY.900 (RIHPHC)		Historic Buildings and Structures
The Captain Welcome Dodge, Sr. House	NRHP-Eligible (RIHPHC Determined)	PAL.105 (RIHPHC)		Historic Buildings and Structures
The Pilot Hill and Seaweed Lane Historic District	NRHP-Eligible (RIHPHC Determined)	PAL.H (RIHPHC)	Southeastern New Shoreham	Historic Buildings and Structures
The Spring House Hotel Cottage	NRHP-Listed	PAL.100 (RIHPHC)		Recreational Properties
The Spring House Hotel	NRHP-Listed	PAL.99 (RIHPHC)		Recreational Properties
The WWII Lookout Tower at Sands Pond	NRHP-Eligible (RIHPHC Determined)	PAL.137 (RIHPHC)		Maritime Safety and Defense Facilities
The WWII Lookout Tower- Spring Street	NRHP-Eligible (RIHPHC Determined)	PAL.82 (RIHPHC)		Maritime Safety and Defense Facilities

3.1.1 Historic Context of New Shoreham

Block Island was home to Native Americans for thousands of years prior to its initial "discovery" by European explorers. Archaeological studies indicate indigenous people were visiting or living on the island at least 7,000 years ago. Giovanni da Verrazzano is credited with discovering and describing the inhabited island during a 1524 voyage to the New World. Sixteen families moved to Block Island in 1662, representing the first permanent European settlement in present-day New Shoreham. For the next two centuries the island's residents developed a significant fishing and processing industry for fish products. Enslaved Africans were among the island's earliest post-Contact Period inhabitants. A National Harbor was established early in the Island's history, and seasonal tourism began in the early-to-mid nineteenth century. Block Island's proximity to major northeastern cities, as well as its natural scenic landscape and charm led to its development as a summer destination. Development of inns, hotels, and other amenities increased around the harbor in the mid-nineteenth century, with the first public house built in 1842 (Gibbs, 1974). As transportation to the island improved with the first recreational steamboat in 1858, the development of summer beach cottages increased. By the mid-nineteenth century it became known as the "Bermuda of the North." The present harbor was constructed between 1870 and 1876 consisting of two rip-rap granite breakwaters that remain relatively unchanged to this day. Although many tourists stayed in boarding houses, inns, and hotels, seasonal summer cottages were being constructed in large numbers by the mid-1880s. It was well-established as a recreation destination for the regional elite by 1890 (Scofield and Adams, 2012).

The resort economy had declined in the first half of the twentieth century but rebounded with the construction of an airport in 1950 (Gibbs, 1974). By the early 1970s, pressure from new development spurred

the creation of the Block Island Conservancy. This effort has contributed to the preservation of open rural spaces on the island and the historic fabric of much of the island's-built environment (PAL, 2012).

3.1.2 NRHP Criteria and the Maritime Visual Setting

The maritime significance of Block Island is well articulated in the 1991 *Historic and Architectural Resources of Block Island, Rhode Island* prepared by the Rhode Island Historic Preservation & Heritage Commission (RIHPHC) as part of a statewide effort to identify and record properties of historic and cultural significance. This survey included a lengthy, well-researched historic context and supporting documentation, including photographs.

Areas of significance described in the *Historic and Architectural Resources of Block Island, Rhode Island* report include "Structures Associated with Block Island's Maritime History" (RIHPHC, 1991), which contains the following description:

> *The special relationship of the island and the surrounding sea is documented in a number of buildings and engineering works-lighthouses, piers, breakwaters, harbors, life-saving stations, and a weather station. The old harbor, both lighthouses, and the weather station are already listed on the Registers, recognizing the importance of maritime concerns the history of the island. If additional structures associated with the sea-faring history of the island are located, they may also be eligible if they retain integrity and if their relationship with Block Island's maritime history is clearly demonstrated* (RIHPHC, 1991).

In addition, the survey report includes "Farms" (RIHPIC, 1991), which contains the following description:

> *The patterns of their agricultural practices have determined, in part, the visual quality of the island today-the cleared land, the low scrub growth, the patchwork of fields intersected by lanes and walls. For several hundred years farming was not only a means of livelihood, but a way of organizing the landscape* (RIHPHC, 1991).

The survey report also includes "Buildings Associated with Block Island as a Resort" (RIHPHC, 1991), which contains the following description:

> *The enormous changes brought to Block Island from the mid-nineteenth century on by the change from relative isolation to a summer resort for vacationers from elsewhere are well documented by some of the island's most important buildings. The construction of boardinghouses, hotels, commercial buildings, and private summer cottages introduced new building forms and types and new patterns of development. In addition, buildings associated with Block Island's history as a resort reflect the introduction of mainstream stylish architectural ideas to the island. The vernacular tradition had continuing vitality, but was now paralleled by the flow of new architectural directions expressed particularly in summer houses.*
>
> *Buildings associated with Block Island's development as a resort may be eligible for the Registers if they are sufficiently well preserved to evidence their type; if they represent a building form introduced to the island as a result of resort development; if they retain their*

> *mass, form, plan, at least some detail and finish; and if they provide evidence of the introduction of mainstream architectural ideals to the island* (RIHPHC, 1991).

The survey report also includes "The Landscape" (RIHPIC, 1991) which includes the following description:

> *On Block Island, more than in most places, the entire assemblage of historic· and natural features has great beauty and significance. Isolated buildings and natural features can be singled out, identified, and treated as remarkable, but this approach will miss the most exceptional aspect of Block Island-that the entire environment is a vivid historic landscape of great appeal (RIHPHC, 1991).*

In each instance, these expanded areas of significance speak directly to the connection that the elements of the New Shoreham Historic Properties have to the sea. Additional historic architectural surveys in 2007 (Gasner, 2007) and 2012 (PAL, 2012) each provided updated recommendations of NRHP eligibility based on established criteria and areas of significance. In addition, a Multiple Property Documentation Form was prepared for Block Island in 2012 that once again revisited the historic context of Block Island and identified five distinct property types with well-defined statements of significance (Scofield and Adams, 2012).

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

The historic properties identified in this HPTP are included within the following property types as defined in the HRVEA: "Historic Buildings and Structures," "Historic Cemeteries and Burial Grounds," "Agricultural Properties," "Recreational Properties," and "Maritime Safety and Defense Facilities." Each property type is defined below as well as the characteristics typical of their maritime setting.

"Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the "Estates and Estate Complexes" property type (see below). These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Historic Buildings and structures not fitting within the previously described types occur throughout the study area and in a variety of local contexts. Location and orientation of such properties is critical to

understanding the nature of any associated maritime settings. Many historic structures were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and Historic Buildings frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

"Historic Cemeteries and Burial Grounds" consists of cemeteries identified by federal, state, or local governmental agencies as having historic significance. These above-ground historic properties may be municipally owned cemeteries on public land, small family plots on private land, or abandoned burial grounds. Historic cemeteries are lasting memorials to the past, provide a guide to the changing values and composition of communities in the course of their historic development.

Typically, cemeteries and burial grounds are not eligible for listing in the NRHP except when they satisfy NPS Criteria Consideration D:

> *"d. A cemetery which derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events"* (NPS, 1990).

Historic cemeteries in the State of Rhode Island are designated and protected as historic resources apart from the NRHP by the Rhode Island Historical Cemetery Commission (RIHCC) and are referred to in the official literature as Rhode Island Historical Cemeteries. Under Chapter 23-18 of the Rhode Island General Law (RIGL), each city and town is required to identify and register historic cemeteries and the RIHCC is empowered to "study the location, condition, and inventory of historical cemeteries in Rhode Island and to make recommendations to the general assembly relative to historical cemeteries in Rhode Island" (RIGL §23-18, 2006.

Historic cemeteries and burial ground vary throughout the study area. Small, private, non-denominational and family cemeteries were relatively common in New England, and many have survived to present-day. Many examples of small cemeteries were associated with specific farms or families and were frequently placed within the available agricultural lands surrounding a farmstead or near multiple associated family farms. Where such burial grounds are located near the water they may be associated with ocean or other maritime viewsheds, however, ocean vistas are less likely to have been a significant consideration in the siting of such cemeteries than their larger, more formal counterparts in the region. Where cemeteries are located within districts or other historic settlements strongly associated with maritime settings, such burial grounds may be sited to maintain a visual connection to the waters in order to maintain a sense of continuity linking the departeds' final resting places with the environment in which they lived. Cemeteries in urban locations expressing such patterns may include formal design elements associated with the "rural cemetery movement" of the 19th century, which sought to create naturalistic, park-like settings to express "an appreciation of nature and a sense of the continuity of life" (NPS National Register Bulletin 41: 6). Maritime views from hillside cemeteries that were intentionally incorporated or framed by landscape designs may be

more sensitive to discordant modern elements than those associated with less formal burial grounds that may not have been specifically located to provide ocean views.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

"Agricultural Properties" consist of historic farm buildings and landscapes which have retained a high degree of integrity and are generally no longer used for their original purpose. These above-ground historic properties feature barns, farmhouses, and large, open tracts of pastureland. They are not located at the shoreline or immediately adjacent to the sea but are situated such that the local topography places them within the PAPE. Generally, these above-ground historic properties do not derive their significance in any direct way from the ocean or maritime activities.

Historic agricultural properties, including farms, farmhouses, barns and related buildings and structures are relatively common in the study area. Many of these properties were built between 1700 and 1850, after which agricultural economies in New England and New York declined sharply. The historic settings for such properties typically include open, agrarian landscapes which once may have afforded open views of the seas when sited along the shoreline or at higher elevations within the coastal interior. Few of the once expansive agrarian landscapes associated with the historic use of the region's farms survive. Some have been altered by later residential and commercial development and many have been transformed by reforestation. Despite these changes, historic agricultural properties remain an important part of the region's heritage and tangible expression of several centuries of intensive farming that transformed the landscapes throughout southern New England and eastern Long Island.

"Recreational Properties" is defined by the role these properties served in their original functions as places for the resort tourism economy of the late-nineteenth century to flourish. These above-ground historic properties feature beaches, casinos, restaurants, and other buildings and structures built to entertain seasonal vacationers. They are typically located near the shoreline or immediately adjacent to the sea, and in some cases, are the beaches themselves. The enjoyment of, and interaction with, the sea are integral features of the significance of these above-ground historic properties. In many cases, the beachfront, shoreline, and adjacent ocean waters are prominent features of the historic setting due to their close association with historic recreational activities.

The same macroeconomic trends that saw the decline of the quintessential New England farm in the mid-19th century are associated with a population shift to cities and rise in affluence for some segments of

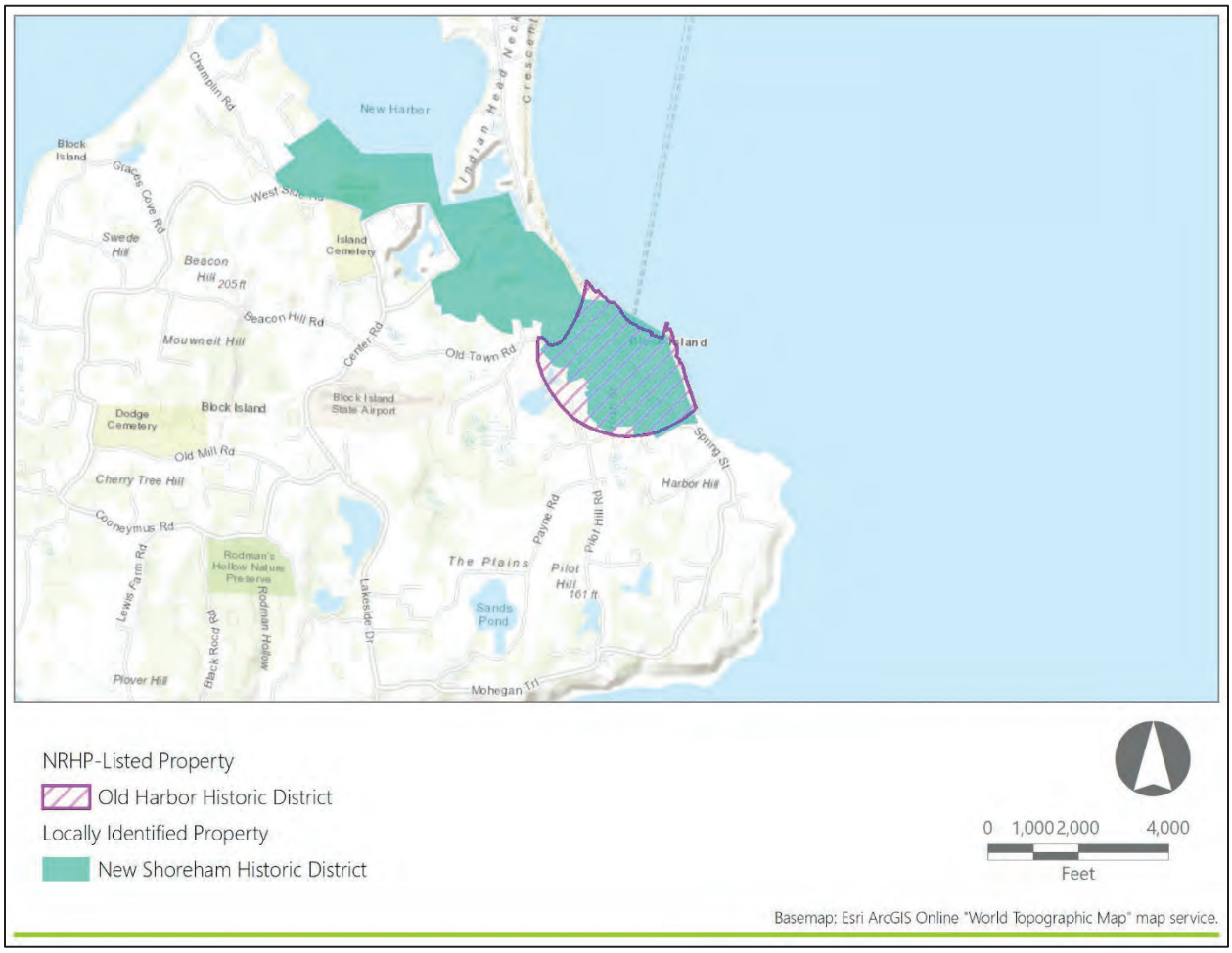
society. Summer resorts, supported by steamships, rail transportation, and eventually, automobiles were developed in numerous locations in the study area in the late 19th century. These resorts varied between properties intended to serve the rising group of "upper middle income" families living in the region's cities to estate-like developments serving a more affluent set. Seaside resorts, like many other shoreline recreational, commercial, and residential properties, were often sited to take advantage of aesthetically pleasing ocean or maritime views. Depending on location and the the conformation of the local shoreline, such properties may be associated with specific bay or cove viewsheds that include limited areas of the open ocean waters. Recreational activities at resorts frequently included swimming and designated beaches where residents and visitors may have spent considerable time during the summer months. Where these features are still present and express a tangible association with the historic resort property, views from beaches may be as important as views from more formal elements of the designed landscape. Likewise, historic hotels and inns became more common elements of the region's shoreline communities in the late 19th century. Such properties were often sited near harbors, ferry landings, rail stations, and public or private beaches and may be associated with similar historic maritime settings. Views to ocean waters or the more intimate bays and coves of the region may have been an integral part of the visitor's motivation for staying in such establishments. Such considerations can be expressed through the inclusion of building and landscape features clearly intended to afford views of ocean. Older taverns and inns in the study area may be found along the working harbors and ports and were intended to serve the fishing, whaling, and related participants in maritime commerce. The design and location of these properties may not show the same influence of aesthetic considerations but will likely also retain a strong association with the waterfront and maritime environment.

"Maritime Safety and Defense Facilities" consists entirely of facilities erected by bureaus of the U.S. Department of Defense or their predecessors and share historic associations with coastal defense. These structures vary in their design and construction materials but are unified by their historic functions of rescuing and protecting maritime transportation in the area, or for coastal defense.

Historic military and maritime safety properties along the shoreline will likely be associated with maritime settings. Aesthetic considerations in the siting of such facilities may or may not be expressed in the design of buildings, structures, and landscapes depending on the age and specific functions of the property. Proximity to navigation channels, defensibility, and the presence of existing shipbuilding or repair infrastructure in a broader maritime context may have been significant considerations in the siting of naval facilities. Such factors may not demonstrate a significant association with open ocean viewsheds. The study area includes several significant examples of World War II-era defense structures, including fire control or observation towers designed to monitor specific parts of the maritime environment. Early lifesaving stations were likewise intended to provide for observation of marine waters in the vicinity of know hazards or where storms posed specific risks to sea-going or coastal vessels. Lifesaving stations were also frequent located where rescue boats or other vessels might be safely launched under treacherous conditions. These locations may have included inlets, harbors or coves adjacent to open waters where rescue and recovery efforts would likely be made.

Maritime settings for historic piers, marinas, and related marine infrastructure are likely to include strong associations with specific harbors, coves, and bays where related activities were focused, and which exerted a significant influence on the design and construction of the historic infrastructure. The relationship of such local settings to ocean waters and the extent to which open ocean views represent an important element of a specific historic property's setting will vary depending on the orientation of the shoreline and the location of the historic property. The size and location of historic buildings and structures relative to each other and other elements of the surrounding environment may also be important to the overall integrity of historic maritime infrastructure.

Figure 3.1-1. Old Harbor Historic District and New Shoreham Historic District Location Map



3.2 Old Harbor Historic District

3.2.1 Physical Description and Existing Conditions

The NRHP-listed Old Harbor Historic District in located in the Town of New Shoreham, Block Island, encompasses an onshore radius of 2,000 feet from the statue of Rebecca at the center of New Shoreham Village Square, located at the intersection of Water, High, and Spring Streets. It is bound to the east by the

Atlantic Ocean and the shoreline. The district includes sections of Chapel, Dodge, High, Main, Spring, and Water Streets and consists of 42 contributing resources, including buildings and sites (Gibbs, 1974).

3.3 New Shoreham Historic District

3.3.1 Physical Description and Existing Conditions

The New Shoreham Historic District is a local historic district/historic district overlay (Town of New Shoreham Historic District Commission, 2022a). The historic district is located along Spring, Water, and Ocean Avenues and Corn Neck Road roughly bounded to the southeast by Amy Dodge Lane; to the northeast by Trims Pond; to the north by Great Salt Pond; and to the west at the intersection of West Side and Champlin Roads (Town of New Shoreham GIS, 2022). There are 321 parcels located within the boundaries of the district including the Old Harbor Historic District, residences, commercial buildings, town-owned properties, and vacant land (Town of New Shoreham Historic District Commission, 2022b).

The topography within the district is that of relatively low and gently rolling hills, with some slightly higher elevations around the periphery, such as along Old Town Road to the west and Spring Street to the south. The buildings within the district include three-and-one-half- and four-and-one-half-story hotels and inns facing the ocean along Water Street, and smaller one-and-one-half- and two-and-one-half-story residences inland and just outside of the village center. The extant historic buildings feature architectural styles of the mid- to late-nineteenth century, such as Gothic Revival, Second Empire, and Queen Anne. Many recently constructed buildings feature matching forms and materials evocative of this period, helping to maintain the historic feeling and association with the district's period of significance. Mansard roofs are common, especially on the hotels and inn buildings, while the residences typically feature gables. Powerful storm surges attributed to global climate change have increased in recent years, leading to damage to both man-made and natural resources within the district (Kelly, 2021). This situation has increased the need for major planning and conservation efforts on Block Island.

3.3.2 Historic Context and Maritime Visual Setting

The Old Harbor Historic District was originally listed on the NRHP under Criteria A (Recreation) and C (Architecture). According to the NRHP Inventory Nomination Form, the district's "… significance lies chiefly in its transformation from a landing site for this early community and modest fishing hamlet, to one of the most popular resorts in America" (Gibbs, 1974). The NRHP document places emphasis on the importance of the construction of the harbor and its breakwaters, relating their completion to the beginning of the growth of the district's significant buildings and the establishment of Block Island as a premier resort destination, specifically noting the following areas of significance:

- Architecture;
- Commerce;
- Engineering;
- Transportation; and
- Other – Maritime Recreation.

Therefore, while the original nomination is nearly 50 years old, the following statement taken from the statement of significance section remains accurate: "Old Harbor is still the only considerable village and remains sharply defined, as a geographical district, amidst the sprawling farm cottages of the countryside" (Gibbs, 1974).

The maritime significance of the district was further elaborated upon in the 1991 *Historic and Architectural Resources of Block Island, Rhode Island* prepared by the RIHPHC. This survey included a lengthy, well-researched historic context and supporting documentation for Old Harbor, including photographs. This historic context established a basis for a subsequent section that expanded on the areas of significance that were noted briefly in the NRHP Inventory Nomination Form.

These areas of significance include "Structures Associated with Block island's Maritime History" (RIHPHC, 1991), which contains the following description:

> *The special relationship of the island and the surrounding sea is documented in a number of buildings and engineering works-lighthouses, piers, breakwaters, harbors, life-saving stations, and a weather station. The old harbor, both lighthouses, and the weather station are already listed on the Registers, recognizing the importance of maritime concerns the history of the island. If additional structures associated with the sea-faring history of the island are located, they may also be eligible if they retain integrity and if their relationship with Block Island's maritime history is clearly demonstrated* (RIHPHC, 1991).

In addition, the survey report includes "Buildings Associated with Block Island as a Resort" (RIHPHC, 1991), which contains the following description:

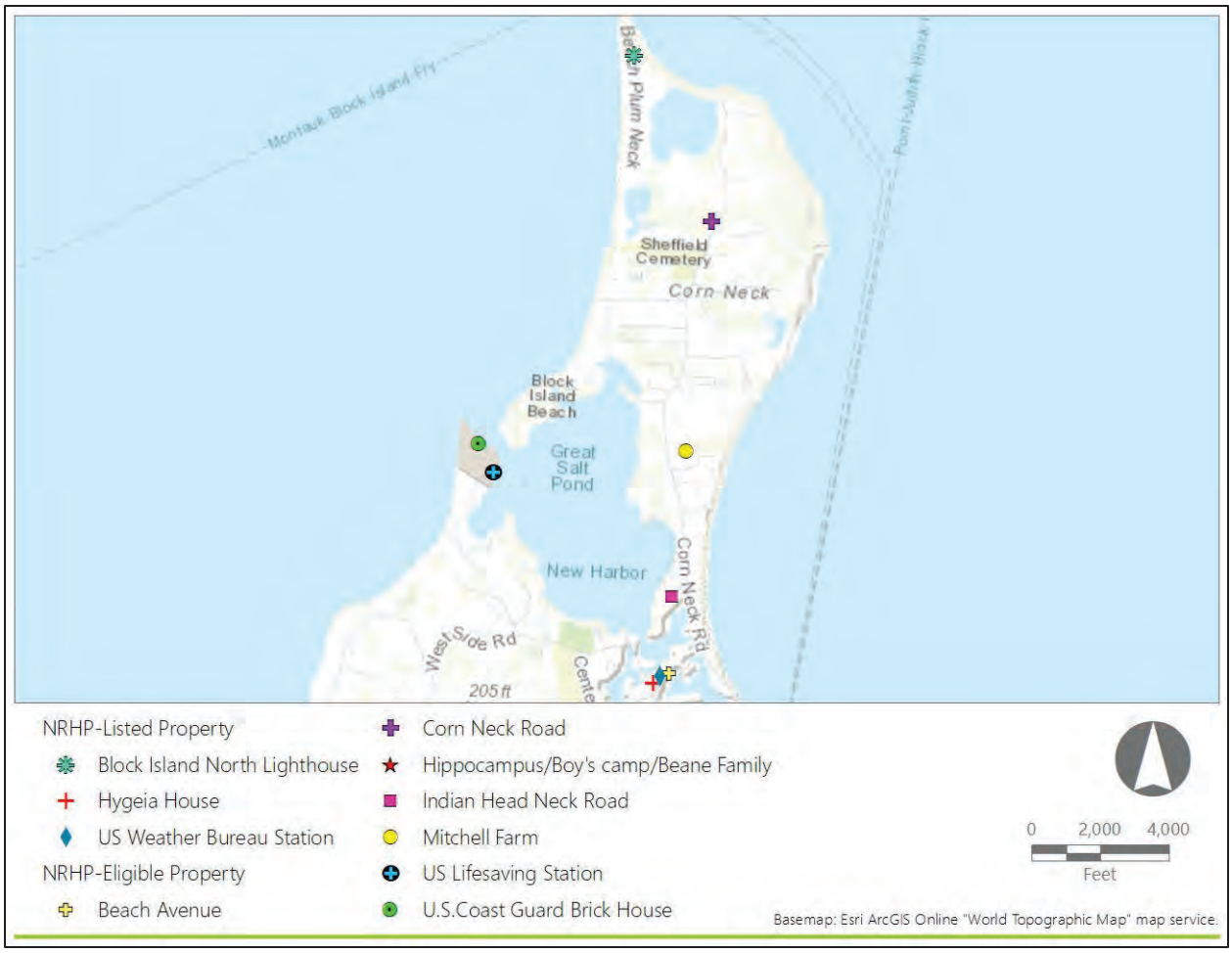
> *The enormous changes brought to Block Island from the mid-nineteenth century on by the change from relative isolation to a summer resort for vacationers from elsewhere are well documented by some of the island's most important buildings. The construction of boardinghouses, hotels, commercial buildings, and private summer cottages introduced new building forms and types and new patterns of development. In addition, buildings associated with Block Island's history as a resort reflect the introduction of mainstream stylish architectural ideas to the island. The vernacular tradition had continuing vitality, but was now paralleled by the flow of new architectural directions expressed particularly in summer houses.*
>
> *Buildings associated with Block Island's development as a resort may be eligible for the Registers if they are sufficiently well preserved to evidence their type; if they represent a building form introduced to the island as a result of resort development; if they retain their mass, form, plan, at least some detail and finish; and if they provide evidence of the introduction of mainstream architectural ideals to the island* (RIHPHC, 1991).

These expanded areas of significance speak directly to the connection that the elements of the built environment in the district have to the sea, including the engineering feats associated with the breakwaters and the inner basin, as well as the alignment of Water Street parallel to the shore. The other expanded areas of significance include Early Houses (before 1850), Farms, and The Landscape, which also have some relevance to the contributing properties of the district. Further historic architectural surveys in 2007 (Gasner, 2007) and 2012 (PAL, 2012) each provided updated recommendations of NRHP eligibility based on

established criteria and areas of significance. In addition, a Multiple Property Documentation Form was prepared for Block Island in 2012 that once again revisited the historic context of Block Island and identified five distinct property type with well-defined statements of significance (Scofield and Adams, 2012).

3.4 Northern New Shoreham Historic Context and Maritime Setting

Figure 3.4-1 Northern New Shoreham Location Map



Northern New Shoreham was clear-cut early in its colonial history in order to facilitate farming. While the agricultural economy has declined, the modern landscape still reflects this historic agricultural use. This history is evident in the form of rectangular fields and stone walls, small residences and buildings like the Benjamin Littlefield Farm (a contributing property to the Corn Neck Road Historic District), and in historic districts like the Mitchell Farm and Corn Neck Road. Crescent Beach was an historic landing site for maritime vessels prior to the establishment of the harbor to the south (RIHPHC, 1991). The first lighthouse at Sandy Point was constructed in 1827 to warn ships away from the dangerous sandbar which forms at the point. The present Block Island North Lighthouse, built in 1867, is the fourth lighthouse on the site. It was known as Sandy Point Light until its name was changed in 1875 (Gibbs, 1974; D'Entremont, 2021). In 1898 a breachway was excavated and the great Salt Pond was made accessible to ships, and a new wharf was subsequently constructed. In the early twentieth century the U.S. Coast Guard station was erected on the south bank of the breachway. Fishing was a major industry until a hurricane decimated the local fleet and wharf structures. Rebuilding efforts were concentrated on the mainland, and consequently fishing never

regained its previous scale. In the later twentieth century recreational boating grew in popularity on the Great Salt Pond, resulting in the construction of the existing docks around the pond (RIHPHC, 1991).

Northern New Shoreham is separated from the rest of Block Island by the Great Salt Pond and New Harbor and connected by the narrow Indian Head Neck. The beaches on the north shore are low, rising slightly along the Crescent Beach shoreline as it moves south. The bucolic setting and relatively low vegetation are evocative of a pastoral island community. This portion of Block Island is approximately one mile wide, tapering to a point as one goes north. Due to its narrow width and some areas of slight topographical elevations, views of the ocean are widely available.

3.4.1 Corn Neck Road Historic District

3.4.1.1 Physical Description and Existing Conditions

The Corn Neck Road Historic District is a cultural landscape that encompasses the entire northern tip of Block Island, surrounded by the Atlantic Ocean on three sides and bounded by Mansion Road to the south. The district includes 29 contributing buildings dating back to the eighteenth century, including the NRHP-listed Block Island North Light (74000008). The landscape features bucolic settings, open fields, forested areas, stone walls, and historic farmsteads. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.4.2 Indian Head Neck Road Historic District

3.4.2.1 Physical Description and Existing Conditions

The Indian Head Neck Road Historic District is located along a peninsula between Corn Neck Road and great Salt Pond on Block Island. The district consists of five one-and-one-half-story summer cottages with wrap-around porches on large parcels. These cottages were built during the late nineteenth century for seasonal tourists and later for year-round residences. The district has clear views of the ocean and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.4.3 The Hippocampus/Boy's camp/Beane Family

3.4.3.1 Physical Description and Existing Conditions

The Hippocampus/Boy's Camp/Beane Family is an approximately 21.5-acre site located on the south tip of Beane Point. It consists of a large, forested area and three buildings constructed in 1934. It was originally constructed as a recreation and nautical training camp for boys between the ages of 12 and 18 years old. Currently owned by the U.S. Fish and Wildlife Service, the property was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.4.4 The Mitchell Farm Historic District

3.4.4.1 Physical Description and Existing Conditions

The Mitchell Farm Historic District is an historic district located along Corn Neck Road on the narrow isthmus between Great Slat Pond and Rhode Island Sound on Block Island. It includes fifteen contributing properties dating from the mid-eighteenth to the mid-twentieth century. Small, forested areas and open fields are delineated by stone walls. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.4.5 The U.S. Lifesaving Station

3.4.5.1 Physical Description and Existing Conditions

The U.S. Lifesaving Station is a one-story building clad in shingles with a gable-and-hip roof, wide bays, and irregular fenestration. The station, built in 1886, was one of 30 such lifesaving stations to be designed by architect Albert Bibb according to a single design plan. The building is situated to take advantage of a scenic view of the Atlantic Ocean to the west (RIHPIC, 1991). The property was determined NRHP-eligible in 1991 (PAL, 2012; PAL, 2013).

3.4.6 The U.S. Coast Guard Brick House

3.4.6.1 Physical Description and Existing Conditions

The U.S. Coast Guard Brick House is a one-story brick 'Officer in Charge' building. It is a part of the U.S. Coast Guard Block Island Station described above and was individually determined NRHP-eligible in 2012 (PAL, 2012; PAL, 2013).

3.4.7 The U.S. Weather Bureau Station

3.4.7.1 Physical Description and Existing Conditions

The U.S. Weather Bureau Station is a two-story Neoclassical-style building set on a brick foundation. The building features a one-story portico supported by pairs of Doric columns, corner pilasters and an entablature. The former U.S. Weather Bureau station was erected in 1903 by the Department of Agriculture according toa design by the firm of Harding and Upman. It served for 46 years as a meteorological observation station before becoming a private residence. It is situated on a hill and commands views overlooking the Old Harbor and the village center to the southeast. It was listed in the NRHP in 1983 (Greenwood, 1983).

3.4.8 The Hygeia House

3.4.8.1 Physical Description and Existing Conditions

The Hygeia House, also known as the Hygeia Annex or the Seaside House, is a 0.76-acre site located on Beach Avenue on Block Island, in New Shoreham, Rhode Island. The property is a two-to-three story, Second Empire-style, wood-frame hotel featuring a mansard roof and a wraparound porch. The hotel is situated on

a steep knoll above Trims Pond. It was designed by Francis Wallace and constructed in 1885 and moved to its present location in 1907. It is significant due to its associations with the patterns of Block Island's history as a fashionable seaside resort destination in the late nineteenth century (Dillon, 2000). It was listed in the NRHP in 2001.

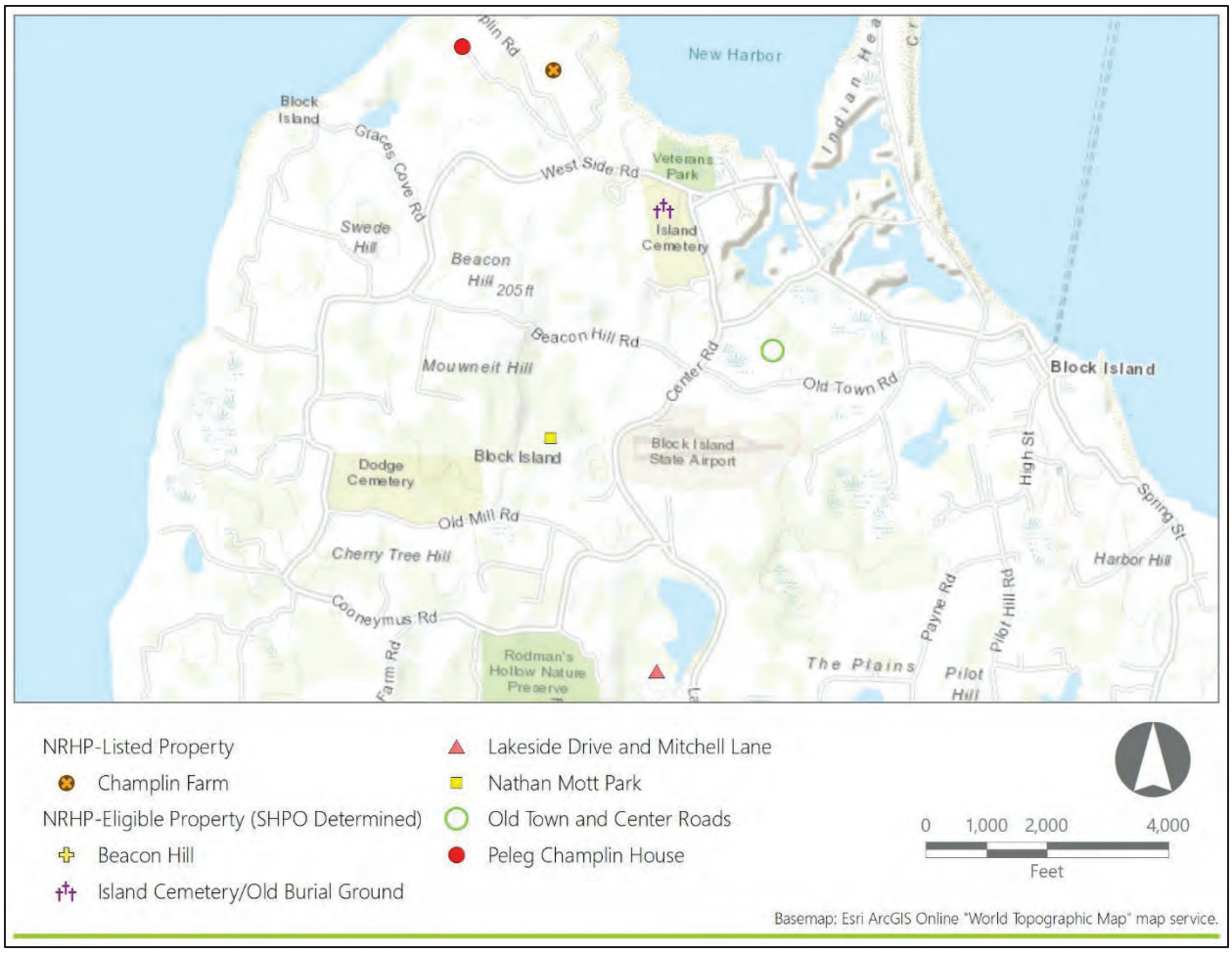
3.4.9 The Beach Avenue Historic District

3.4.9.1 Physical Description and Existing Conditions

The Beach Avenue Historic District is a small, compact neighborhood on a narrow spit separating Trims Pond and Harbor Pond. The district encompasses residential and inn properties built in the late nineteenth to early twentieth centuries. The U.S. Weather Bureau Station and Hygeia House properties, both listed on the NRHP, are contributing resources to the historic district. Well-preserved examples of several architectural styles are included, ranging from Second Empire to Gothic Revival to Neoclassical (PAL, 2012). Although eclectic, the district retains its essential cohesiveness and distinction among the compact developments of Block Island.

3.5 Interior New Shoreham Historic Context and Maritime Setting

Figure 3.5-1. Interior New Shoreham Location Map



For the purposes of this HPTP, Interior New Shoreham is broadly defined as the area south of the Great Salt Pond from Spring and the Old Harbor Historic District in the east to the west coast of Block Island, and southern to Rodman's Hollow. Early settlement by Europeans followed much the same pattern of small agricultural estates spread across the gently rolling topography. Extant early residences like the Peleg Champlin House feature post and beam construction and are clad in shingles and are often found on plots enclosed by fieldstone walls. During the rise of recreational settlement on Block Island in the late nineteenth century, cottage construction likewise increased across the interior of Block Island (RIHPHC, 1991). A subsequent wave of summer cottage construction occurred during the late twentieth century, with much of the work involving the renovation of existing structures, such as the Samuel Ball house, built circa 1680 and substantially rebuilt in 1980 (PAL, 2012).

The maritime atmosphere of the interior of Block Island comes through in its architecture and landscape. The interior of the Island is a rural landscape crossed by meandering roads and long driveways, low stone

walls or picket fences, and some forested areas with low trees. The roads are narrow, and in some cases unpaved. The west coast of Block Island consists of low-lying beaches, as opposed to the elevated dunes of the west coast and the bluffs of the south.

3.5.1 The Peleg Champlin House

3.5.1.1 Physical Description and Existing Conditions

The Peleg Champlin House is a one-and-one-half-story gable-roofed residence clad in cedar shingles. The house features a rear wing extension, a central chimney, and rustic detailing throughout the interior. The house is located on a hill overlooking Block Island Sound to the west. Built in circa 1820 by farmer and lifelong Block Island resident Peleg Champlin, the house remained in the family until 1973. The house has a high level of integrity and is significant as an example of vernacular architecture on Block Island from the early nineteenth century. It was listed in the NRHP in 1982 (Greenwood, 1983).

3.5.2 The Lakeside Drive and Mitchell Lane Historic District

3.5.2.1 Physical Description and Existing Conditions

The Lakeside Drive and Mitchell Lane Historic District is an historic district located between Lakeside Drive and Cooneymus Road, just south of the Block Island airport. The district includes Fresh Pond and thirteen contributing buildings. The buildings within the district date from the mid-eighteenth to the mid-twentieth century. The landscape is a significant element of this district, featuring gently rolling topography, stone walls, open fields, and modest homestead which characterize the historic lifeways of Block Island. The district was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.5.3 The Nathan Mott Park

3.5.3.1 Physical Description and Existing Conditions

The Nathan Mott Park is a public park located on approximately 39 acres within the NRHP-eligible Beacon Hill district (PAL.M). The origin of the park dates to the death of Lucretia Mott Ball, who bequeathed 77 acres of farmland in 1941. Subsequent modifications of the boundary reduced the space to its present acreage. The property is significant as the site of the original settlement of Mott's ancestors John and Margaret Rathbun, who established themselves on Block Island in 1661. The park is also representative of conservation and land stewardship on Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.5.4 The Champlin Farm Historic District

3.5.4.1 Physical Description and Existing Conditions

The Champlin Farm Historic District is an historic farmstead located on approximately 16.6 acres of land along Coast Guard Road on Block Island. The farm complex consists of a two- and-one-half-story frame residence, two frame barns, and four sheds. The farm is associated with the Champlin family, who have been

farmers on Block Island since the late eighteenth century. The property was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.5.5 The Old Town and Center Roads Historic District

3.5.5.1 Physical Description and Existing Conditions

The Old Town and Center Roads Historic District is an historic district located in the center of Block Island consisting of what was once the original town center, from the west boundary of the Old Harbor Historic District to Center Road. The district includes 48 contributing properties that date from the late-seventeenth to the mid-twentieth century. Historic markers denote the locations of non-extant mills and structures. The oldest structure in the district is the Samuel Ball house, constructed in 1680. The district represents the traditional architecture and development of early Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.5.6 The Beacon Hill Historic District

3.5.6.1 Physical Description and Existing Conditions

The Beacon Hill Historic District is an historic district located west of the Block Island airport from Beacon hill Road to Old Mill Road in the south. It is representative of residential, agricultural, and military development on Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.5.7 Island Cemetery/Old Burial Ground

3.5.7.1 Physical Description and Existing Conditions

The Island Cemetery/Old Burial Ground is located on a 10.7-acre parcel located at the intersection of West Side and Center Roads (Vision Government Solutions, 2022). The cemetery is located in the northern, interior section of New Shoreham on elevated land. The cemetery is the oldest cemetery on Block Island (Scofield and Adams, 2012).

3.6 Southern New Shoreham/Mohegan Bluffs Historic Context and Maritime Setting

Figure 3.6-1. Southern New Shoreham Location Map



The southern coastline of Block Island was the least developed area over most of its early history after the arrival of Europeans. It was mostly agricultural lands until Dr. Abby E. Vaill purchased 16 acres of land on the south side of Mohegan Trail to establish a sanitorium in 1884, that eventually included several cottages, a hotel and a golf course. Vaill Cottage is the only extant building from Dr. Vaill's original development of a retreat to cater to the health and wellness of late-nineteenth century visitors (Scofield, 2012). Currently the Vaill Cottage (described in Section 3.4.3) is the only building remaining from this period of building development. This portion of Block Island has other extant cottages from this period not associated with the Vaill complex, such as the Mohegan Cottage. While some later residential construction has increased the density along Mohegan Trail, the area to the west of the road is still largely open space, wooded areas, and ponds punctuated by houses overlooking the bluffs.

3.6.1 The Mohegan Cottage

3.6.1.1 Physical Description and Existing Conditions

The Mohegan Cottage, also known as Everett D. Barlow House, is a two-and-one-half-story Queen Anne-style building located on Snake Hole Road. Built in 1886 as a summer home for New York City lawyer Everett D. Barlow, the house was designed by Charles Miller and features Swiss-inspired ornamentation. It was determined eligible for listing on the S/NRHP in 2013 due to its associations with Block Island recreation (PAL, 2012; PAL, 2013).

3.6.2 Lewis-Dickens Farm

3.6.2.1 Physical Description and Existing Conditions

The Lewis Farm and Dickens Farm Road Historic District is an historic agricultural landscape district encompassing most of the southeast corner of Block Island from Cooneymus Road to the Atlantic Ocean. It consists of thirteen contributing properties dating from the mid-eighteenth to the mid-twentieth century. Landscape features such as stone walls and open fields enhance the pastoral setting of the district. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.6.3 Vaill Cottage

3.6.3.1 Physical Description and Existing Conditions

The Miss Abby E. Vaill/1 of 2 Vaill Cottages is a one-and-one-half-story cottage set upon an approximately two acres on a bluff overlooking the ocean. It was built in 1885 for New York City physician Abby E. Vaill, as part of a greater recreation complex which included a hotel, additional cottage and a golf course. The 1885 Vaill Cottage is the only extant building from this complex. It was determined to be eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

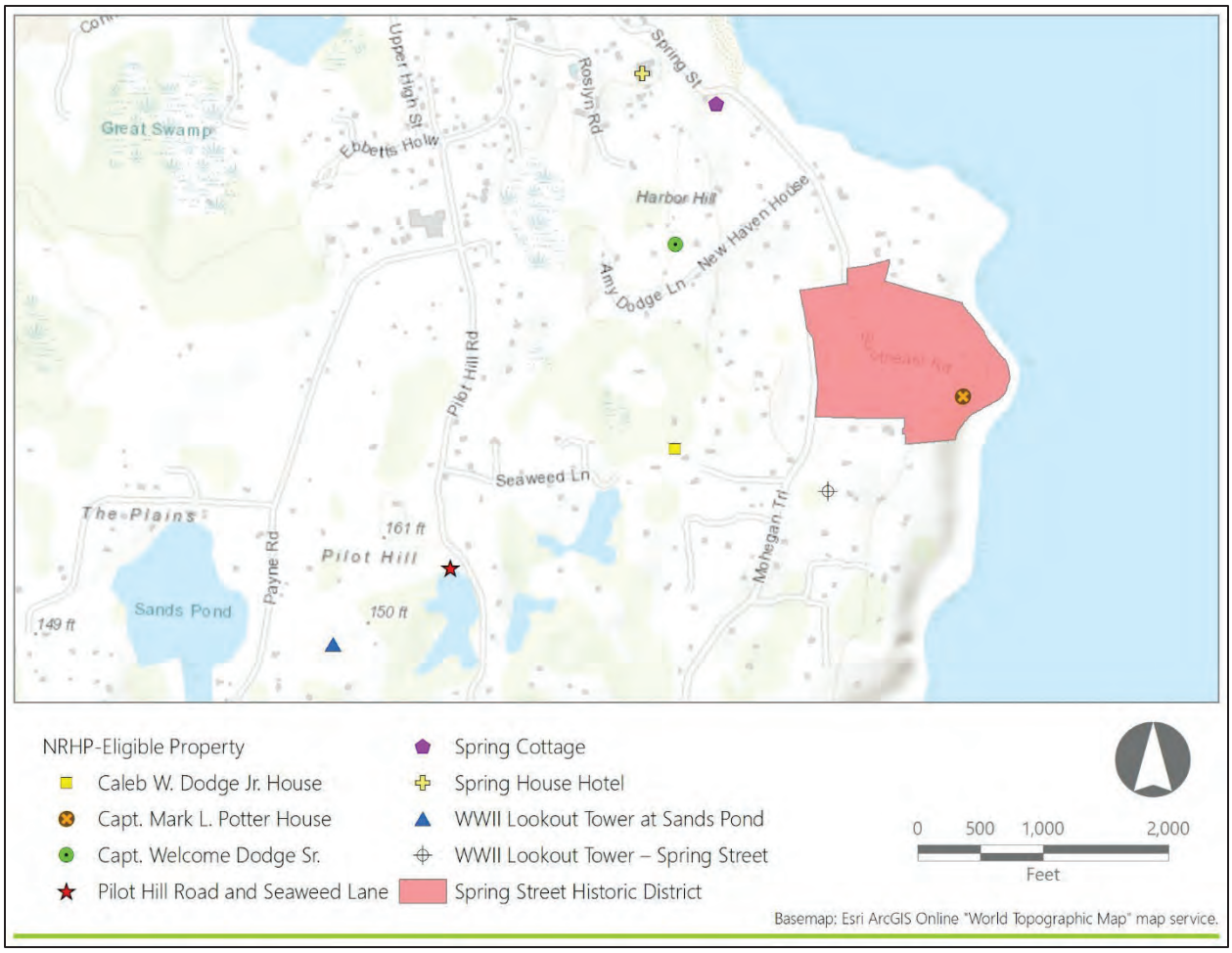
3.6.4 The Hon. Julius Deming Perkins/"Bayberry Lodge"

3.6.4.1 Physical Description and Existing Conditions

The Hon. Julius Deming Perkins/"Bayberry Lodge" is a two-story, Shingle Style frame building built in 1898. It was originally the summer home of Rhode Island State Senator and railroad magnate Julius D. Perkins. It was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7 Southeastern New Shoreham Historic Context and Maritime Setting

Figure 3.7-1. Southeastern New Shoreham Location Map



Southeastern Block Island consists primarily of the seasonal residences and neighborhoods around the outskirts of the Old Harbor Historic District. Seasonal tourism began on Block Island in the early-to-mid nineteenth century. As transportation to the island improved with the first recreational steamboat in 1858, the development of summer beach cottages increased. The construction of the two breakwaters in 1870, accessing the island became easier and raised the number of visitors from throughout New England and New York. Wealthy residents of New York and New England constructed seasonal residences to the south of the Harbor and throughout the Island. Local newspapers ran articles describing some of these new cottages and often reported on the arrival of individual residents. The seasonal residents and the development of their cottages forever changed the landscape, economy, and culture of Block Island.

The setting of this portion of Block Island is picturesque, with the highest concentration of homes overlooking the bluffs below than anywhere else on the island. Houses and hotels built with wraparound porches and ocean views speak to the importance of the sea to the residents. In addition, this seaward-oriented part of Block Island was utilized during World War Two as a forward observation center and

included the construction of lookout towers such as those still extant at Sands Pond and Spring Street (see Sections 3.5.9 and 3.5.10, respectively).

3.7.1 Spring Street Historic District

3.7.1.1 Physical Description and Existing Conditions

The Spring Street Historic District is located in the southeastern portion of the Town of New Shoreham, Block Island, and south of the NRHP-listed Old Harbor Historic District. It is roughly bounded by Old Harbor Point Road at the north, the bluffs at the east, properties south of Southeast Road at the south, and Spring Street at the west.

The Spring Street Historic District consists of approximately 14 extant contributing resources dating from the early-nineteenth to the early-twentieth centuries (PAL, 2013). The vernacular cottages are sided in shingles and clapboard, surrounded by large, landscaped lawns, stone walls, and characteristic coastal brush vegetation. These seasonal residences were typically situated to maximize the ocean view from atop the bluffs and are accessed from small dirt roads and driveways off Spring Street. A preliminary list of contributing resources is listed below in Table 3.1-2.

Table 3.7-1. Potential Contributing Resources included in the Spring Street Historic District

Name	Plat	Lot	Approximate Date of Construction
John Wright/Millikin	8	33	1860
Unknown/converted barn	8	35	1875
Capt. Warren A. Ball/Carlotto	8	38	1900
Capt. Warren A. Ball/cottage	8	39	1850
Edward Gideon Ball/Russell Larson	8	42	1850
Capt. Mark L. Potter/"Pine Lodge"/Potter Place/Potter Mansion	8	48	1901
Estate of Newton C. Kimball, Bronx, NY/Kimball Cottage	8	49	1880
Edward J. Faile/Brunberg Cottage	8	50	1928--DEMOLISHED
Capt. Potter Carriage House	8	52	1890
Unknown/not in surveys	8	55	1910
Capt. Nathaniel Dodge	8	62	1876
Charles Greene/Joseph & Monica Hull Shea	8	65	1820
Charles H. Hall/John Steffian	8	66	1860
Unknown/Clarence McClarren/Ernie Howarth/John Handy	8	130	1880
Unknown/not in surveys	8	54	1905

3.7.2 The Caleb W. Dodge Jr. House

3.7.2.1 Physical Description and Existing Conditions

The Caleb W. Dodge Jr. House is a one-and-one-half-story Cape Cod cottage set upon approximately 1.3 acres of land. The cottage was built around 1850, and represents the residential development of Block Island, and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.3 The Capt. Mark L. Potter House

3.7.3.1 Physical Description and Existing Conditions

The Capt. Mark L. Potter House is a two-and-one-half-story four-square home on an approximately 2.45-acre lot overlooking the ocean. It features scalloped shingles and a wrap-around porch with turned columns. The house was built in 1901 as a summer home for Brooklyn shipmaster Captain Mark Potter. It was moved away from the nearby bluffs in the 1970s. This property represents the residential development of Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.4 The Capt. Welcome Dodge Sr. House

3.7.4.1 Physical Description and Existing Conditions

The Capt. Welcome Dodge Sr. House is a one-and-three-quarter-story frame cottage situated in a hollow off of Amy Dodge Lane on Block Island. Captain Welcome Dodge built the house in 1840, and it remained in the family until 1972. This property represents the residential development of Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.5 The Pilot Hill Road and Seaweed Lane Historic District

3.7.5.1 Physical Description and Existing Conditions

The Pilot Hill Road and Seaweed Lane Historic District is an historic district located along Pilot hill Road between Payne Road and Mohegan trail at the southeast corner of Block Island. It includes ten properties that date from the mid-eighteenth to the mid-twentieth century and is also characterized by stone walls and open agricultural fields that give a pastoral setting to the district. The district represents both the residential development and the seasonal tourism of Block Island and was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.6 The Spring House Hotel Cottage

3.7.6.1 Physical Description and Existing Conditions

The Spring House Hotel Cottage is a one-and-one-half-story frame cottage located on an approximately one-acre site. The building features board-and-batten walls and a one-story wrap-around porch. It was originally constructed in 1880 across the road and moved to its present location is 1895. It was determined to be eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.7 The Spring House Hotel

3.7.7.1 Physical Description and Existing Conditions

The Spring House Hotel is a two-and-one-half-story Italianate building built upon an approximately 7.3-acre lot. Built in 1877, the building features a cupola topped with a mansard roof and is wrapped by a bracketed porch. The hotel has remained open for recreational and seasonal visitors since its construction. It is a contributing resource to the Old Harbor Historic District (74000012) and was determined to be individually eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.8 The World War Two Lookout Tower at Sands Pond

3.7.8.1 Physical Description and Existing Conditions

The World War Two Lookout Tower at Sands Pond is a two-story square tower built during World War Two for military observation of Rhode Island Sound. The tower at Sands Pond is attached to a one-and-one-half-story wood-shingled house has been converted into a private residence. This structure was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

3.7.9 The World War Two Lookout Tower at Spring Street

3.7.9.1 Physical Description and Existing Conditions

The World War Two Lookout Tower at Spring Street is a two-story cylindrical tower built during World War two for military observation of Rhode Island Sound. The tower at Spring Street is attached to a one-story wood-shingled structure resembling a cottage. This structure was determined eligible for listing on the NRHP in 2012 (PAL, 2012; PAL, 2013).

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed below. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Development and Implementation of the Coastal Resiliency Plan

4.1.1 Purpose and Intended Outcome

Coastal erosion, threats of severe storms, sea level rise, storm surge, and climate change are constant threats to the historic properties in the Town of New Shoreham. The 2016 *New Shoreham Comprehensive Plan* identifies the need to "increase resiliency of the island to climate change and sea level rise impacts by implementing appropriate adaptation measures" (Town of New Shoreham, 2016). The plan also acknowledges the need to "plan for effects of projected sea level rise and flooding" (Town of New Shoreham, 2016).

Prior to an event of destruction and damage resulting from a natural disaster, public engagement is needed to identify historic preservation priorities and goals, and long-range climate adaption measures that preserve the character and setting associated with historic properties. The purpose of this HPTP is to develop and implement a Coastal Resiliency Plan to protect the coastal historic properties and associated historic settings in New Shoreham. The intended outcome of this HPTP is to develop measures that the Town of New Shoreham and historic property owners can take to ensure the long-term preservation of the physical structures as well as and to maintain the maritime setting of the historic properties located along the coastline of New Shoreham. Public engagement is needed to identify historic preservation priorities and goals, and long-range climate adaption measures that preserve the character and setting associated with historic properties.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Review of existing town planning and hazard mitigation documents and regulations;
- Photography and documentation (e.g. mapping) of existing conditions;
- Public outreach in order to identify historic preservation priorities and concerns;
- Development of a draft Coastal Resiliency Plan incorporating the results of the public outreach which will be submitted to the Participating Parties for review and comment;

- Development of a final plan to be distributed to the Participating Parties; and
- Implementation of priority projects identified in the plan.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services and select a consultant to perform the scope of work listed in Section 4.1.2. The preferred consultants will have experience in developing coastal resiliency plans for historic properties. The consultants will engage the public and Participating Parties to develop a list of prioritized action items to protect and preserve historic properties. The draft and final plans will be developed in consultation with the Participating Parties. The plan will include a list of priority projects including implementation plans, accurate cost estimates, and schedules for completion.

A second RFP will be released to perform the implementation of the priority projects as identified in the plan and determined by the Participating Parties. The chosen professional will document the existing conditions, including photographs, prior to commencing any work and will complete as-built documentation, including photographs at the completion of the project.

4.1.4 Standards

The project will comply with the following standards:

- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68);
- The Secretary of the Interior's Guidance on the Identification of Historic Properties (36 CFR 800.4);
- The Town of New Shoreham Building, Zoning, Land Use & Planning guidance and regulations, as applicable; and
- The Town of New Shoreham Historic District Commission guidance and regulations, as applicable.

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Photographs and documentation of existing conditions.
- Draft plan;
- Final plan; and
- As-built documentation.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

4.2 Town-wide National Register of Historic Places Nomination

4.2.1 Purpose and Intended Outcome

The built environment of the Town of New Shoreham as well as its natural scenic landscape and charm lead to Block Island's development as a summer destination. As transportation to the island improved with the first recreational steamboat in 1858, the development of summer beach cottages increased and with the construction of two breakwaters in 1870, accessing the island became easier and increased the number of visitors from throughout New England and New York. Although many tourists stayed in boarding houses, inns, and hotels, seasonal summer cottages were being constructed in large numbers by the mid-1880s (Scofield, 2012). While there has been new construction and additions to existing buildings over time, the character and feeling of the built environment remains as it did in the past.

The purpose of this mitigation measure is to recognize and document the historic and cultural significance in New Shoreham by completing a NRHP Nomination for the entire Town of New Shoreham. There have been surveys completed to identify historic properties in the Town of New Shoreham, including the *Historic and Architectural Resources of Block Island* in 1991 (RIHPHC, 1991); however, a small portion of the historic properties have been listed on the NRHP. This measure intends to document the eligible historic properties on the island to produce a single nomination.

Listing properties on the NRHP not only documents the history of the area and specific properties but can help build community knowledge and pride. Nomination Forms can be used as educational tools for both the owners of the properties and the community as a whole and can help guide the future restoration and rehabilitation of the buildings. NRHP listing also allows properties to be eligible for state and federal grant funding and historic tax credit programs. NRHP listing does not place any restrictions on a property, nor does it prevent the remodeling or demolition of the building or allow for public access to the building. It does not in any way restrict the rights of the private property owner.

4.2.2 Scope of Work

The scope of work will consist of the following:

- Research of available historic sources and documentation;
- Field survey and conditions assessments;
- Annotated photographs;
- Drafting of the NRHP listing document;
- Submitting the draft for review and comment to the Participating Parties; and
- Developing a final NRHP Nomination to be provided to the Participating Parties.

4.2.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant to perform the scope of work listed in Section 4.2.2. The consultant selected will prepare a draft nomination form, prepared in accordance with applicable NPS and RIHPHC guidance. The draft document will include a historic context and statement of significance, identification, photographs, and descriptions of all contributing resources, and all maps and photographs required by NPS guidance. A final draft will be produced by the consultant that incorporates comments and additional information provided by the Participating Parties. The final document will be presented to the Rhode Island State Historic Preservation Office Review Board.

4.2.4 Standards

The project will comply with the following standards:

- The Secretary of the Interior's Guidance on the *Identification of Historic Properties* (36 CFR 800.4);
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61);
- The National Park Service's (NPS) *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation,* as applicable (NPS, 1997a);
- *National Register Bulletin 16a: How to Complete the National Register Registration Form* (NPS, 1997b); and
- RIHPHC guidance.

4.2.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Preliminary Draft of the NRHP Nomination Form; and
- Revised draft of the NRHP Nomination Form.

4.2.6 Funds and Accounting

It is anticipated that funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[4] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[4] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has

conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Town of New Shoreham Historic Properties, January 27, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 26 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: THE BROWNING'S BEACH HISTORIC DISTRICT, TOWN OF SOUTH KINGSTOWN, WASHINGTON COUNTY, MASSACHUSETTS

[Insert ATTACHMENT 26 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

The Browning's Beach Historic District

Town of South Kingstown, Washington County, Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding for:	The Browning's Beach Historic District
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
DEIS	Draft Environmental Impact Statement
EDR	Environmental Design and Research, D.P.C.
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposal
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWF	Revolution Wind Farm
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft, applicant-proposed Historic Property Treatment Plan (HPTP) for Browning's Beach Historic District, which is listed on the National Register of Historic Places (NRHP (hereinafter, the historic property) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic property, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (hereafter, Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
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- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic property discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic property included in this HPTP. Set within its historic context, the applicable NRHP criteria for the historic property is discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic property, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

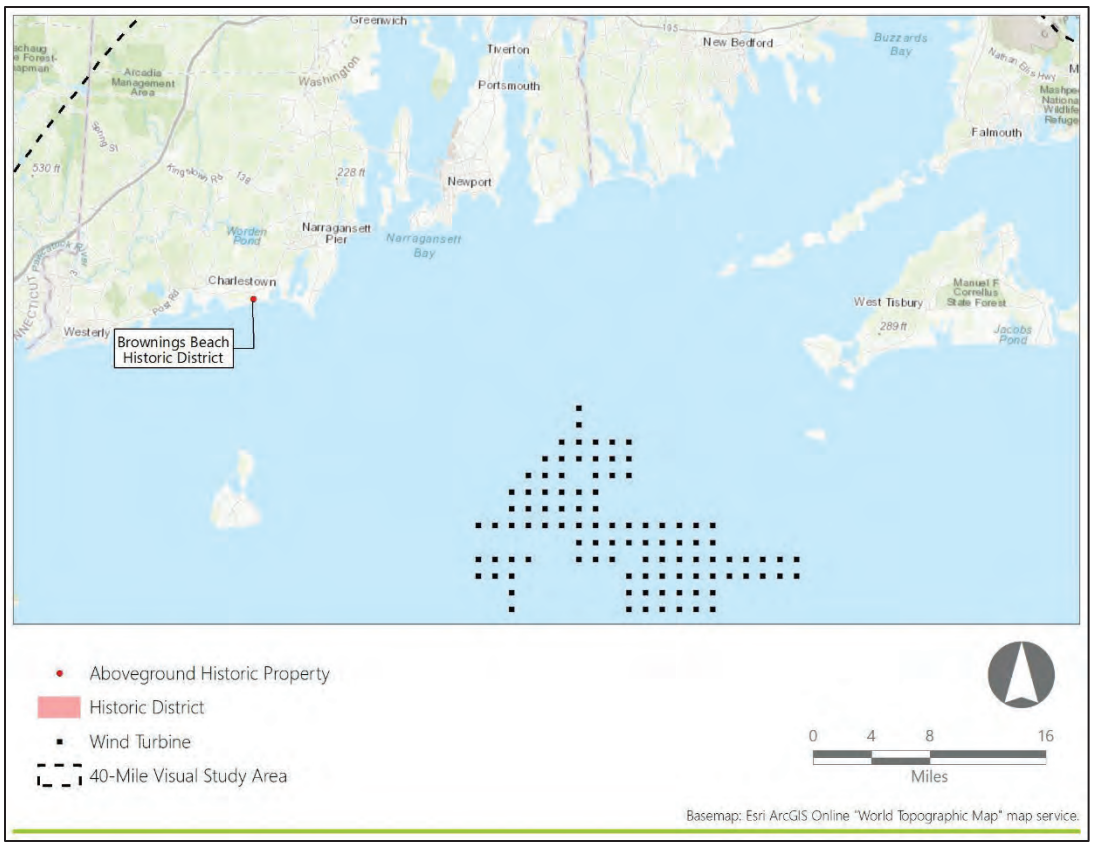
- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- The Town of South Kingstown
- The Rhode Island Historical Preservation & Heritage Commission.

Revolution Wind anticipates the above-listed parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

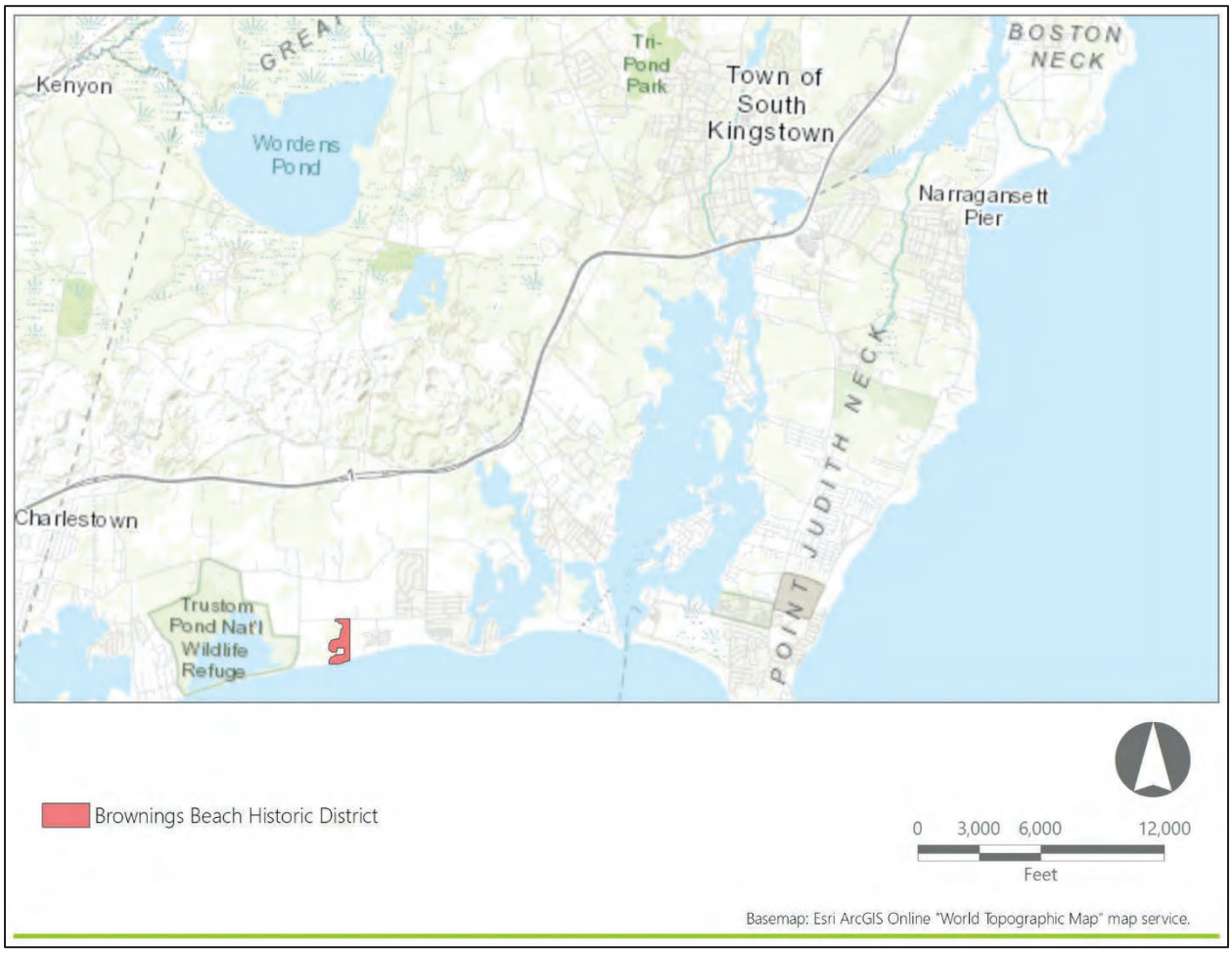
3.1 Historic Properties

This Historic Properties HPTP involves one historic property, as identified in Table 3.1-1 and located on Figure 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Browning's Beach Historic District	NRHP-Listed	South Kingstown	Rhode Island	97000952 (NRHP)	Private	Historic Buildings and Structures

Figure 3.1-1. Historic Property Location



In Section 3.3 the historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this report.

Browning's Beach Historic District is considered within the historic property type defined in the HRVEA as "Historic Buildings and Structures" includes buildings and associated properties historically used as residences (in some instances their current use may be commercial, municipal, institutional, or otherwise non-residential) and is the largest grouping of above-ground historic properties within the PAPE. Historic Buildings and Structures within the PAPE consist mostly of vernacular residences, or groupings of

residences, although this above-ground historic property type also includes historic parks and stone markers. The overall character of these individual above-ground historic properties and districts is residential or intended for public enjoyment, as opposed to the grand mansions and summer "cottages" built by wealthy industrialist families that typified the Estates and Estate Complexes property type. These above-ground historic properties are typically listed due to each resource's unique significance or the combined significance of the resources forming an historic district, and usually qualify under National Register Criteria A and C. These factors are shared among the resource to a degree which justifies their grouping as an above-ground historic property type.

Location and orientation of such properties is critical to understanding the nature of any associated maritime settings. Many historic houses were oriented to local roadways, with the front and rear elevations parallel to the nearby road's alignment. Local roadways along the region's shorelines often parallel the water's edge and historic homes frequently shift in orientation along such coastal roads. This variation in orientation may strongly influence the associated views of marine waters that may form important elements of a property's historic setting.

3.3 Browning's Beach Historic District

3.3.1 Physical Description and Existing Conditions

The Browning's Beach Historic District is an NRHP-listed district located in South Kingstown along a private drive extending south of Cards Pond Road (also referred to as Card Ponds Road). The district encompasses approximately 20 acres and includes single family residences constructed in the late nineteenth and early twentieth century as part of a residential complex (Youngken, 1997). The district boundaries stretch south from Cards Pond Road, include a small peninsula extending west into Cards Pond and continues south to the barrier beach facing the Atlantic Ocean.

Review of modern aerial photography reveals that only five of the contributing resources are currently extant, including three buildings on the barrier beach, one building on the peninsula in Cards Pond, and one building on the east side of the private drive between the peninsula and the barrier beach. The buildings appear to have been removed or demolished between 2012 and 2014 (Google Earth, 2022).

3.3.2 Historic Context

The collection of residences constituting the Browning's Beach Historic District were constructed between circa 1895 and circa 1905 as a coastal Rhode Island summer colony, a popular trend at this time throughout coastal Rhode Island. It originated as a private enclave for a group of prominent Rhode Island families including the Knight, Webster, Lapham-Treat, and Noyes families. The complex was designed to take advantage of the recreation offered by the seaside location. There was a communal boardwalk traversing the ocean dunes, a beach cabana which housed changing rooms for bathing, as well as a tennis court, a large stable, shared water system, and shared private drive providing access to the residences (Youngken, 1997).

The district was listed in the NRHP in 1997 and consisted of 10 contributing buildings and one non-contributing building. The contributing buildings consisted of single dwellings representing Queen Anne, Shingle, and Craftsman/Bungalow-style residences constructed between circa 1895 and circa 1905. The district featured wood-framed, one-story to two-and-one-half-story houses. A variety of roofing forms were found in the district, including gabled, gambrel, and gable-on-hip roofs. These houses were typically sheathed in wood shingles, but board-and-batten siding was also present. The private drive providing access to the residences was narrow and graveled (Youngken, 1997).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Browning's Beach Historic District meets NRHP Criterion C as a collection of late-nineteenth and early-twentieth century residences constructed as a summer colony in coastal Rhode Island. The district derives its significance from its maritime location on the coast, representing the significant trend of summer colonies in Rhode Island. The beach provided recreation for the residents, and by extension the view and setting of the Atlantic Ocean is a significant element to the historic district.

4.0 MITIGATION MEASURES

Mitigation measures at the historic property are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Historic Context for Summer Cottage/Resort Development

4.1.1 Purpose and Intended Outcome

As stated above, similarly, to other coastal communities in the region, in the late nineteenth century and through the twentieth century, summer cottages, resorts, and summer colonies began to develop in South Kingstown. These areas were attractive to the upper class for their proximity to Boston and New York and their locations on the water. The rapid rise of local and regional industries, urbanization, and ease of transportation by steam trains and ships in the late nineteenth century was associated with a new leisure class in New England. Scenic coastal enclaves and villages attracted families whose wealth may have been derived from the region's cities, but who sought escape from dense urban centers. Numerous communities developed to cater the recreational and social needs of wealthy families along the shores of Buzzards Bay, Narragansett Bay, and the coastal islands

The purpose of this mitigation measure is to develop a regional context/history of the development of summer cottages, colonies, and resorts on the Rhode Island and Massachusetts coastlines in the late-nineteenth and early-twentieth centuries. The report will include: a brief history of each municipality, focusing on the built environment; an in-depth analysis of the neighborhoods/areas that became summer resorts/colonies; the social and economic impacts of the development; the changes in the built environment of the municipalities; and other related topics.

The intent of this report is to document this important movement in New England history, which changed the cultural, economic, and landscape of Rhode Island and Massachusetts. The report will be completed in coordination with all relevant stakeholders and the final report will be distributed to the municipalities and SHPOs.

4.1.2 Scope of Work

The scope of work will consist of the following:

- Conduct archival research;

- Identify and consult with relevant stakeholders and the Participating Parties;
- Develop a draft report to be distributed to the Participating Parties for review and comment; and
- Develop a final report, addressing the comments received, to be distributed to the Participating Parties.

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work and select a consultant to perform the scope of work listed in Section 4.1.2. The consultant should have a demonstrated knowledge and experience in developing historic contexts focusing on changes in the social, economic, and built environment and a knowledge of the history of New England. A draft of the report will be distributed to the Participating Parties for review and comment. A final report will be produced by the consultant that incorporates any comments and additional information provided by the Participating Parties and will be distributed to the Participating Parties.

4.1.4 Standards

The exhibit will conform to the following standards:

- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable;
- RIHPHC guidance;
- MHC guidance;

4.1.5 Documentation

The following documentation is to be provided for review by Participating Parties:

- Request for Proposals (RFP);
- Proposals by qualified consultants in response to the RFP;
- Preliminary draft report; and
- Final report.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties

concurrent with BOEM's NEPA substitution schedule[2] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

[2] The timeline is subject to change and is based on current available information.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic property. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Rhode Island Historic Properties, February 3, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

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ATTACHMENT 27 – HISTORIC PROPERTIES TREATMENT PLAN FOR THE REVOLUTION WIND FARM: EIGHT HISTORIC LIGHTHOUSES, MASSACHUSETTS AND RHODE ISLAND

[Insert ATTACHMENT 27 – TREATMENT PLAN ABOVE-GROUND HISTORIC PROPERTIES THAT WILL BE VISUALLY ADVERSELY AFFECTED]

DRAFT

Applicant-Proposed Draft – Subject to Review by BOEM and Consulting Parties

Draft Historic Property Treatment Plan

for the

Revolution Wind Farm

Eight Historic Lighthouses

Massachusetts and Rhode Island

Submitted to:

Bureau of Ocean Energy Management
U.S. Department of the Interior

Prepared for:

Revolution Wind | Powered by Ørsted & Eversource

Revolution Wind, LLC
https://revolutionwind.com/

Prepared by:

Environmental Design & Research, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
www.edrdpc.com

July 2022

ABSTRACT

Federal Undertaking:	Revolution Wind Farm and Revolution Wind Export Cable Project
Location:	Outer Continental Shelf and Rhode Island
Federal and State Agencies:	Bureau of Ocean Energy Management National Park Service U.S. Army Corps of Engineers Massachusetts Historical Commission Rhode Island Historical Preservation & Heritage Commission New York Historic Preservation Office Connecticut Historic Preservation Office Advisory Council on Historic Preservation
Regulatory Process:	National Environmental Policy Act Section 106 of the National Historic Preservation Act Section 110(f) of the National Historic Preservation Act
Purpose:	This draft, applicant-proposed Historic Property Treatment Plan provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated November 2021 for the Revolution Wind Project.
Potential Adverse Visual Effect Finding For:	The Sakonnet Light Station, Little Compton, Newport County, RI The Block Island North Lighthouse, New Shoreham, Washington County, RI The Point Judith Lighthouse, Narragansett, Washington County, RI The Beavertail Light, Jamestown, Newport County, RI The Tarpaulin Cove Light, Gosnold, Dukes County, MA The Clark's Point Light, New Bedford, Bristol County, MA The Butler Flats Light Station, New Bedford, Bristol County, MA The Nobska Point Lighthouse, Falmouth, Barnstable County, MA
Submitted By:	Revolution Wind, LLC
Date:	July 2022

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADLS	Aircraft Detection Lighting System
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations

COP	Construction and Operations Plan
EDR	Environmental Design and Research, D.P.C.
DEIS	Draft Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FR	Federal Register
HPTP	Historic Property Treatment Plan
MHC	Massachusetts Historical Commission
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NPS	National Park Service
NRHP	National Register of Historic Places
RFP	Request for Proposals
RIHPHC	Rhode Island Historical Preservation & Heritage Commission
ROD	Record of Decision
RWEC	Revolution Wind Export Cable
RWF	Revolution Wind Farm
SOI	Secretary of the Interior
USCG	United States Coast Guard
WTG	Wind Turbine Generator

1.0 EXECUTIVE SUMMARY

This draft applicant-proposed Historic Property Treatment Plan (HPTP) for the Sakonnet Light Station, the Block Island North Lighthouse, the Point Judith Lighthouse, the Beavertail Light, the Tarpaulin Cove Light, the Clark's Point Light, the Butler Flats Light Station, and the Nobska Point Lighthouse, all of which are listed on the National Register of Historic Places (the historic properties) provides background data, historic property information, and detailed steps that will be implemented to carry out mitigation actions to resolve potential adverse effects preliminarily identified by the applicant in the *Historic Resources Visual Effects Analysis – Revolution Wind Farm*, dated July 2022 (HRVEA; EDR, 2022) for the Revolution Wind Farm (RWF) and Revolution Wind Export Cable Project (collectively, the Undertaking). Revolution Wind LLC (Revolution Wind) is providing this draft HPTP prior to the Bureau of Ocean Energy Management (BOEM) making findings of adverse effect for the Undertaking under the National Historic Preservation Act of 1966 (NHPA), and finalization of this draft HPTP remains subject to BOEM's final finding of adverse effect for the historic properties.

BOEM will use the National Environmental Policy Act (NEPA) substitution process to fulfill its Section 106 obligations as provided for in the NHPA implementing regulations (36 CFR § 800.8(c)), and BOEM has notified the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers, and consulting parties of BOEM's decision to use this process. Revolution Wind has provided this draft HPTP to BOEM for inclusion in the Draft Environmental Impact Statement (DEIS) for review by consulting parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. This draft HPTP describes the applicant-proposed mitigation measures to resolve potential adverse effects on historic properties and proposes the implementation steps and timeline for actions. The mitigation measures are based on the evaluations and outreach performed by Revolution Wind prior to the issuance of the DEIS. Revolution Wind anticipates the HPTP documents will undergo revision and refinement in consultation with the Massachusetts State Historic Preservation Officer, the Rhode Island State Historic Preservation Officer, the ACHP, and/or other consulting parties throughout the NEPA substitution process. If BOEM makes a finding of adverse effect for the historic properties, it is anticipated that the mitigation measures described herein (and further refined through consultation with applicable parties) will be included in the Record of Decision (ROD) and/or Memorandum of Agreement (MOA) issued in accordance with 40 CFR parts 1500-1508, and 36 CFR §§ 800.8, 800.10.

The timeline for implementation of the mitigation measures will be determined in consultation with parties that demonstrated interest in the affected historic properties (the Participating Parties) based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[1] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).

[1] The timeline is subject to change and is based on current available information.

- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

This draft HPTP is organized into the following sections:

- **Section 1.0, Introduction**, outlines the content of this HPTP.

- **Section 2.0, Cultural Resources Regulatory Context**, briefly summarizes the Undertaking while focusing on cultural resources regulatory contexts (federal, tribal, state, and local, including preservation restrictions), identifies the historic properties discussed in this HPTP that will be adversely affected by the Undertaking, and summarizes the pertinent provisions and attachments of the HRVEA (EDR, 2022) and *Revolution Wind Farm Construction and Operations Plan* (COP; Revolution Wind, 2021) that guided the development of this document.

- **Section 3.0, Existing Conditions, Historic Significance, and Maritime Setting**, provides a physical description of the historic properties included in this HPTP. Set within its historic context, the applicable National Register of Historic Places (NRHP) criteria for the historic properties are discussed with a focus on the contribution of a maritime visual setting to its significance and integrity.

- **Section 4.0, Mitigation Measures**, presents specific steps to carry out the applicant-proposed mitigation actions identified in the COP or alternative measures developed through stakeholder engagement meetings to date. The mitigation action includes a detailed description, intended

outcome, methods, standards, and requirements for documentation. The mitigation action details may be revised, based on feedback gathered during the process.

- **Section 5.0, Implementation**, establishes the process for executing mitigation actions at the historic properties, as identified in Section 4.0 of this HPTP. For each/the action, organizational responsibilities are outlined, a timeline is provided, and regulatory reviews are listed.

- **Section 6.0, References**, is a list of works cited in this HPTP.

2.0 BACKGROUND INFORMATION

2.1 Project Overview: Revolution Wind Farm and Revolution Wind Export Cable

The Undertaking is a wind-powered electric generating facility composed of up to 100 wind turbine generators (WTGs) and associated foundations, two offshore substations, and inter-array cables connecting the WTGs and the offshore substations (see Figure 2.1-1). The WTGs, offshore substations, array cables, and substation interconnector cables would be located on the Outer Continental Shelf approximately 15 nautical miles (18 statute miles) southeast of Point Judith, Rhode Island, approximately 13 nautical miles (15 statute miles) east of Block Island, Rhode Island, approximately 7.5 nautical miles (8.5 statute miles) south of Nomans Land Island National Wildlife Refuge (uninhabited island), and between approximately 10 to 12.5 nautical miles (12 to 14 statute miles) south/southwest of varying points of the Rhode Island and Massachusetts coastlines (62 FR 33708). In addition, two submarine export cables located in both federal waters and Rhode Island State territorial waters, will connect the offshore substation to the electrical grid. The proposed interconnection location for the Undertaking is the existing Davisville Substation, which is owned and operated by The Narragansett Electric Company d/b/a National Grid and located in North Kingstown, Rhode Island. The visible offshore components of the operational Undertaking will be located on Lease OCS-A 0486 in water depths ranging from approximately 108 to 125 feet.

Figure 2.1-1. Project Location



2.2 Section 106 and Section 110(f) of the National Historic Preservation Act (NHPA)

The regulations at 36 CFR § 800.8 provide for use of the NEPA process to fulfill a federal agency's NHPA Section 106 review obligations in lieu of the procedures set forth in 36 CFR § 800.3 through 800.6. Under these provisions, issuance of an ROD and implementation of relevant conditions will resolve adverse effects to historic properties caused by the Undertaking, including to National Historic Landmarks for which BOEM must provide a higher standard of care, as required by Section 110(f) of the NHPA.

The measures to avoid and minimize adverse effects to identified historic properties are described in the COP (Section 4.4.1.3 and Appendix BB). This HPTP describes the applicant-proposed treatment plans to resolve the remaining adverse effects after application of the above-referenced measures. The mitigation measures reflect a refinement of the conceptual mitigation framework proposed by Revolution Wind (see Appendix BB in the COP).

All activities implemented under this HPTP will be conducted in accordance with any conditions imposed by BOEM in its ROD and with applicable local, state and federal regulations and permitting requirements. Responsibilities for specific compliance actions are described in further detail in Section 5.2, Organizational Responsibilities.

2.2.1 Municipal Regulations

Before implementation, any on-site mitigation measures will be coordinated with local municipalities and commissions to obtain approvals, as appropriate. These may include, but are not limited to building permits, zoning, land use, planning, historic commissions, and design review boards. Additional information regarding compliance with local requirements appears in Section 5.0, Implementation.

2.2.2 Preservation Easements and Restrictions

Preservation easements and restrictions protect significant historic, archaeological, or cultural resources. The State of Massachusetts preservation restrictions are outlined in Massachusetts General Law Chapter 184, Sections 31-33 and Rhode Island General Law Title 42, Section 42-45-9.1 established a historic preservation easement fund. Any mitigation work associated with the Historic Properties will comply with the conditions of all extant historic preservation easements (see Table 2.2.2-1). Additional information regarding compliance with extant preservation restrictions appears in Section 5.0, Implementation.

Table 2.2.2-1. Restrictions at the Historic Properties

Restriction	Legislation	Agency
Sakonnet Light Station – Historic Preservation	Rhode Island General Law Title 42, Section 42-45-9.1	RIHPHC
Block Island North Light – Historic Preservation	Rhode Island General Law Title 42, Section 42-45-9.1	RIHPHC
Block Island North Light – Aid to Navigation	10 USC 2668 Easements for Rights of Way	USCG

Restriction	Legislation	Agency
Beavertail Light – Historic Preservation	Rhode Island General Law Title 42, Section 42-45-9.1	RIHPHC
Clark's Point Light – Historic Preservation	Massachusetts General Law Chapter 184, Sections 31-33	MHC
Butler Flats Light Station – Aid to Navigation	10 USC 2668 Easements for Rights of Way	USCG
Nobska Point Lighthouse – Aid to Navigation	10 USC 2668 Easements for Rights of Way	USCG

2.3 Participating Parties

BOEM initiated consultation under Section 106 with invitations to consulting parties on April 30, 2021. BOEM hosted the first Section 106-specific meeting with consulting parties on December 17, 2021, and Revolution Wind anticipates that BOEM will hold additional meetings pursuant to Sections 106 and 110(f) of the NHPA and in accordance with 36 CFR 800.8.

Following BOEM initial Section 106 meeting with consulting parties, Revolution Wind held stakeholder outreach meetings (see Section 5.3) to review conceptual mitigation measures for the historic property and invited the following parties:

- Block Island Historical Society
- U.S. Coast Guard
- Martha's Vineyard Commission
- Town of Narragansett
- Town of Jamestown
- Town of Little Compton
- City of New Bedford
- Beavertail Lighthouse Museum Association
- Trustees of Reservations
- Town of Gosnold
- Cuttyhunk Historical Society
- Town of Barrington
- Friends of Sakonnet Light
- Lighthouse Preservation Society
- The Rhode Island Historical Preservation & Heritage Commission
- The Massachusetts Historical Commission.[2]

Revolution Wind anticipates these parties and any subsequently identified parties will participate in the finalization of this HPTP through BOEM's Section 106 consultation process.

[2] MHC was invited to attend stakeholder outreach meetings regarding historic properties in Massachusetts; however, MHC has not participated in outreach meetings for Revolution Wind.

3.0 EXISTING CONDITIONS, HISTORIC SIGNIFICANCE, AND MARITIME SETTING

3.1 Historic Properties

This HPTP involves 12 historic properties, as identified in Table 3.1-1.

Table 3.1-1. Historic Properties included in the HPTP

Name	Property Designation	Municipality	State	Site No. (Agency)	Ownership	Historic Property Type
Nobska Point Lighthouse	NRHP-Listed	Falmouth	MA	87001483 (NPS) FAL.LH (MHC)	Private	Lighthouses and Navigational Aids
Sakonnet Light Station	NRHP-Listed	Little Compton	RI	83000179 (NPS)	Private	
Block Island North Lighthouse	NRHP-Listed	New Shoreham	RI	74000008 (NPS)	Public – Municipal	
Point Judith Lighthouse	NRHP-Listed	Narragansett	RI	88000279 (NPS)	Public – USCG	
Beavertail Light	NRHP-Listed	Jamestown	RI	77000024 (NPS)	Public – USCG	
Tarpaulin Cove Light	NRHP-Listed	Gosnold	MA	87001505 (NPS) GOS.900 (MHC)	Public – USCG	
Clark's Point Light	NRHP-Listed	New Bedford	MA	82005273 (NPS) NBE.909 (MHC)	Public – Municipal	
Butler Flats Light Station	NRHP-Listed	New Bedford	MA	87001530 (NPS) NBE.908 (MHC)	Public – Municipal	

In Sections 3.3 through 3.10, each historic property is described both physically and within its historic context, with a focus on the contribution of a maritime visual setting to the property's significance and integrity.

3.2 Maritime Setting

For the purposes of this analysis and assessment, views of marine waters are considered critical aspects of maritime settings. The influence of the marine environment and related human activities on historical

development patterns is extensive and may be expressed in areas without direct lines of sight to the sea. Although these types of setting may contribute to the significance of historic properties, they would not be subject to alteration as a result of the proposed undertaking and are not considered further in this plan.

The historic properties included in this HPTP are all considered within the historic property type defined in the HRVEA as "Lighthouses and Navigational Aids" which is defined by the historic associations with water-related transportation and defense, prominent views of the sea and dominance of the surrounding landscape, and common architectural forms. These structures present themselves as prominent and iconic features on the coastal landscape, possess elevated views of the ocean horizon, and are sited specifically for those elevated views.

Lighthouses and other historic navigation aids in the study area include properties that were intended to serve mariners plying large areas of open water and other properties that served specific navigation routes through the complex and treacherous waters of the region's bays. All of these properties have an obvious association with maritime settings, but the scale of those settings will vary due to the conformation of the local landscape and seas and the design and purpose of each navigation aid.

3.3 The Sakonnet Light Station

3.3.1 Physical Description and Existing Conditions

The Sakonnet Light Station is an approximately 66-foot-tall "sparkplug" type lighthouse located upon Little Cormorant Rock, a rock outcrop off Sakonnet Point in Little Compton, Rhode Island. The lighthouse tower is constructed of brick with a cast iron exterior wall and sits atop a brick and concrete caisson. The caisson is painted black while the cast iron tower and lantern are painted white. Tower fenestration includes double-hung windows with cast iron pediments at the three lower levels and porthole windows at the uppermost level (Jones, 1982).

3.3.2 Historic Context

Funding to construct the Sakonnet Light Station was approved by Congress in 1882. The lighthouse was built between 1883 and 1884 and was the first aid to navigation along a long stretch of previously unlit coastline. The lighthouse is one of many prefabricated cast iron towers built during a nationwide boom in lighthouse construction between 1850 and 1910. The Sakonnet Light Station was staffed by a keeper and an assistant keeper (in later years, two assistants) who resided in the tower (Jones, 1982; D'Entremont, 2021a).

The lighthouse was significantly damaged by the Great New England Hurricane of 1938. After it was damaged again in Hurricane Carol in 1954, it was decommissioned by the United States Coast Guard (USCG). Following several years of abandonment, it was purchased in 1961 by Carl Haffenreffer, listed in the NRHP in 1983, and donated to Sakonnet Point Lighthouse, Inc. in 1985. The lighthouse was subsequently restored and was finally relighted in 1997. Another substantial restoration took place between 2010 and 2012 (D'Entremont, 2021a).

3.3.3 NRHP Criteria and the Maritime Visual Setting

The Sakonnet Light Station meets NRHP Criteria A and C for its association with the history of commerce and transportation in Rhode Island and as an example of nineteenth-century lighthouse engineering and prefabrication. According to Jones (1982), Sakonnet Light is a representative example of the standardized, prefabricated cast-iron tower that "played a pivotal role in the evolution of the country's lighthouse system, and is a notable survivor from the system's era of greatest growth." The lighthouse retains a high degree of integrity of feeling and setting in its dramatic site atop a rock outcrop roughly 2,500 feet from the mainland.

The Sakonnet Light Station was constructed to identify the mouth of the Sakonnet River "as a refuge for coasting vessels during storms, and servicing as an aid to navigation along a long, then-unlighted stretch of coastline" (Jones, 1982). As stated above, the Sakonnet Light Station was damaged by hurricanes in 1938 and 1954 and remained unlit and inactive for over forty years. While historically, the light was an indicator directing vessels to a safe location to wait out storms, today the light can be seen from approximately seven nautical miles. The maritime setting of the Sakonnet Light Station is inextricably linked to its historic and current use and historic significance.

3.4 The Block Island North Lighthouse

3.4.1 Physical Description and Existing Conditions

The Block Island North Lighthouse is located on Sandy Point, Block Island, within the Block Island National Wildlife Refuge. The lighthouse is comprised of a two-and-one-half-story granite residence with a gable roof and a single-story wing. The main roof is surmounted by a chamfered square iron tower and cast-iron lantern over the primary elevation. The building has Italianate style segmental arch hood moldings and pedimented entrances (Gibbs, 1974).

3.4.2 Historic Context

The first lighthouse at Sandy Point was constructed in 1827 to warn ships away from the dangerous sandbar which forms at the point. The present Block Island North Lighthouse, built in 1867, is the fourth lighthouse on the site. It was known as Sandy Point Light until its name was changed in 1875 (Gibbs, 1974; D'Entremont, 2021b).

The Block Island North Lighthouse was automated in 1956. It was deactivated in 1973 and listed in the NRHP the following year. The site was subsequently acquired by the United States Fish and Wildlife Service, which transferred the lighthouse and a 2-acre parcel to the Town of New Shoreham in 1984. The lighthouse was returned to service in 1989, and the first floor of the lighthouse opened as a museum in 1993, with the original Fresnel lens on display. The tower and lantern underwent a substantial restoration in 2009 (D'Entremont, 2021b).

3.4.3 NRHP Criteria and the Maritime Visual Setting

The Block Island North Lighthouse meets NRHP Criteria A and C for its association with the history of commerce and transportation in Rhode Island, and as an example of mid-nineteenth century architecture and lighthouse engineering. The lighthouse retains a remarkable degree of integrity of feeling and setting due to the preservation of its original roughly 30-acre site as a wildlife refuge.

According to the NRHP Nomination Form when Block Island North Lighthouse was constructed it was visible for thirteen and a half miles and had a fixed white light. The light marked the entrance to both Block Island and Long Island Sounds and provided guidance to vessels to avoid the sand bar located off Sandy Point. (Gibbs, 1974). The location and function of Block Island North Lighthouse as aid to navigation both locally around Sandy Point and more regionally as an entrance to Block Island and Long Island Sounds are important aspects of its significance.

3.5 The Point Judith Lighthouse

3.5.1 Physical Description and Existing Conditions

The Point Judith Lighthouse is located at 1470 Ocean Road in Narragansett, Rhode Island, within the approximately 4.8-acre USCG Station Point Judith. The lighthouse is a 51-foot-tall octagonal battered granite tower with a cast iron lantern. Fenestration consists of one window each at the first, third, fourth, and fifth floor levels. The entrance is via a simple arched doorway. The daymark consists of the unpainted dark brown upper half contrasting with the lower half which is painted white. A small single-story gable-roofed oil house (1917) stands southeast of the lighthouse and a single-story hip-roofed brick fog signal building (1923) is located to the southwest (York, 1987).

3.5.2 Historic Context

The first lighthouse at Point Judith was constructed in 1810. The current Point Judith Lighthouse, the third on the site, was completed in 1857, and originally included a brick keeper's residence connected to the lighthouse via a covered walkway. A fog signal, added in 1867, was converted to a steam whistle in 1872, and an assistant keeper's dwelling was added in 1874. In 1931, the first radio beacon at a Rhode Island lighthouse was put into service at Point Judith. Both the keeper's and assistant keeper's dwellings were demolished in the mid-twentieth century. A U.S. Life-Saving Station established just east of the lighthouse in 1876 became Point Judith Coast Guard Station in 1915. It was administered separately from the lighthouse until 1939 when the USCG assumed responsibility for the nation's aids to navigation. The lighthouse was automated in 1954 and continues to be maintained by the USCG (York, 1987).

3.5.3 NRHP Criteria and the Maritime Visual Setting

The Point Judith Lighthouse meets NRHP Criteria A and C for its association with the history of commerce and transportation in Rhode Island, for its role in the technological development of aids to navigation, and as an example of mid-nineteenth century lighthouse engineering.

While the existing lighthouse was constructed in 1867, a Point Judith Lighthouse has served as an active lighthouse guiding vessels along the coast of Rhode Island since the first structure was built in 1810. The lighthouse was constructed to guide vessels traveling between New York and New England around the rough, rocky coastline of Narragansett, an area also very prone to dense fog (D'Entremont, 2021f). The maritime setting on an exposed peninsula is inextricably linked to the Point Judith Lighthouse's historic use and significance.

3.6 The Beavertail Light

3.6.1 Physical Description and Existing Conditions

The Beavertail Light is located at the southern tip of Conanicut Island at the mouth of Narragansett Bay. The lighthouse is an approximately 45-foot-tall square-plan granite tower with a cast iron lantern. The tower's stone construction, consisting of alternating rows of long and short stone units resulting in a quoin effect at the corners, is unique among New England lighthouses. The tower is connected to a two-story hip-roofed keeper's house. An assistant keeper's house and signal house are also located on the site, along with several additional support buildings (Jones, 1977).

3.6.2 Historic Context

Beavertail Point has been the location of lighthouses and beacons since the early eighteenth century. The first lighthouse at Beavertail Point (the third constructed in the American colonies) was a wood structure completed in 1749. Its replacement was burned by British forces in 1779; it was repaired and continued in service until the present lighthouse and keeper's house were built in 1856. An assistant keeper's house was added in 1898 and many additional ancillary structures were built in the ensuing decades (Jones, 1977).

The second and third lighthouses at Beavertail Point were the site of technological advances in navigational aid technology in the nineteenth century. An early experiment with gas illumination took place in 1817-1818, and from about 1857 to 1881, a succession of first-of-their-kind trumpets and whistles were installed. The light was electrified in 1931 and automated in 1972 (Jones, 1977).

3.6.3 NRHP Criteria and the Maritime Visual Setting

The Beavertail Light meets NRHP Criteria A and C for its association with the history of commerce and transportation in Rhode Island, for its role in the technological development of aids to navigation, and as a unique example of mid-nineteenth-century lighthouse engineering.

The Beavertail Light is located at the southern tip of Conanicut Island in Jamestown between the east and west passages of Narragansett Bay. Beavertail Point consists of rocky outcroppings and the lighthouse was strategically located to warn vessels of the dangerous conditions (Jones, 1977). In 1838 the light was visible for 15.75 nautical miles (D'Entremont, 2021g). The maritime setting on an exposed peninsula is inextricably linked to the Beavertail Light's historic use and significance.

3.7 The Tarpaulin Cove Light

3.7.1 Physical Description and Existing Conditions

The Tarpaulin Cove Light is located on the largely undeveloped Naushon Island, in a grassy meadow surrounded by a stone wall. The lighthouse consists of a 38-foot-tall cylindrical brick tower with a cast iron lantern and gable-roofed brick entry house atop a concrete foundation. The tower and entry house are painted white, and all windows have been infilled (Tait et al., 1986).

3.7.2 Historic Context

The first lighthouse at Tarpaulin Cove was established in 1817 along what was then one of the busiest shipping channels in the world. Tarpaulin Cove was historically used as a refuge during storms and by ships awaiting favorable winds as they traveled in and out of Vineyard Sound. The current lighthouse was built in 1856 and remodeled in 1891. The fog bell was destroyed in the hurricane of 1938 and the light was automated in 1941. The wood frame keeper's house (1888) and other ancillary structures were demolished in 1962. The lighthouse is owned by the USCG and maintained by the Cuttyhunk Historical Society (Tait et. Al., 1986; D'Entremont, 2021c). Naushon Island was purchased by the Forbes family in the 1840s and remains under family trust ownership today.

3.7.3 NRHP Criteria and the Maritime Visual Setting

The Tarpaulin Cove Light meets NRHP Criteria A and C for its association with the history of commerce and transportation in Massachusetts and as an example of mid-nineteenth-century lighthouse engineering. The lighthouse retains a remarkable degree of integrity of feeling and setting due to the preservation of Naushon Island's natural landscape.

The Tarpaulin Cove Light was located on Naushon Island to help guide vessels through Vineyard Sound. In Isaiah William Penn Lewi, also known as I.W.P. Lewis, was hired by Water Forward, Secretary of the Treasury, to review the spending of the Lighthouse Service. Lewis visited the lighthouses of Massachusetts, New Hampshire and Maine and produced a report of his findings. According to *The History of Tarpaulin Cove Light, Gosnold Massachusetts,* Lewis' report stated the "tower is not high enough to clear the land to the westward so the light in that directions is of no use to vessels near the shore (D'Entremont, 2021c)." In 1856 and again in 1870 improvements were made to the lens and frequency of flashes to improve the visibility of the light (D'Entremont, 2021c). The lighthouse remains an active aid to navigation. This maritime setting is inextricably linked to the Tarpaulin Cove Light's historic use and significance.

3.8 The Clark's Point Light

3.8.1 Physical Description and Existing Conditions

The Clark's Point Light consists of a square wood tower and cast-iron lantern atop Fort Taber, a seven-sided, three-story, D-shaped granite fort sited on the tip of a promontory south of the city of New Bedford. The tower is painted white and contains six-over-six wood windows (Butler, 1973).

3.8.2 Historic Context

An early lighthouse at Clark's Point was completed in 1797 but burned about a year later. Its replacement was also destroyed by fire in 1803. A stone tower was completed in 1804 and extended in 1818. The lantern was replaced in 1865. Construction of Fort Taber began in 1857 and was completed in 1863 adjacent to the existing 1804 lighthouse. Because the tower's walls blocked views of the lighthouse, a new wood tower was built onto the fort and the 1865 lantern was relocated and entered into service in 1869. The stone lighthouse was demolished in 1906. The establishment of an offshore light at Butler Flats in 1898 rendered the Clark's Point Light obsolete. The fort and lighthouse were restored in the 1970s and again in 2000-2001. The site is now maintained as a public park (Butler, 1973; D'Entremont, 2021d). The lighthouse and fort were listed in the NRHP as part of the Fort Taber Historic District in 1973.

3.8.3 NRHP Criteria and the Maritime Visual Setting

The Clark's Point Light meets NRHP Criteria A and C for its association with the development of American coastal fortifications, and as an example of mid-nineteenth century military and lighthouse engineering. The lighthouse and fort retain a high degree of integrity of setting and feeling.

The Clark's Point Light is located in Buzzard's Bay on the west side of the mouth of the Acushnet River and New Bedford Harbor and was located in this location to guide vessels into New Bedford Harbor. In 1818 the light was located 52 feet above sea level and when the lighthouse was replaced in 1869 the light was at a height of 68 feet above sea level (D'Entremont, 2021d). This maritime setting is a key component of the Clark's Point Light's historic significance.

3.9 The Butler Flats Light Station

3.9.1 Physical Description and Existing Conditions

The Butler Flats Light Station is a 53-foot-tall "sparkplug" type lighthouse located roughly 2,000 feet offshore east of Clark's Point at the entrance to New Bedford Harbor. The lighthouse consists of a cylindrical brick tower and cast-iron lantern atop a stone- and concrete-filled cast iron caisson. The caisson foundation was sunk directly into the soft, muddy bottom of New Bedford Channel. The interior contains four levels of storage and living space, as well as a watchroom. Curved iron plates at the top of the caisson deflect waves and support a covered exterior gallery (Tait et al., 1986).

3.9.2 Historic Context

The Butler Flats Light Station was constructed in 1898 to replace the Clark's Point Light (see Section 3.8.2). At the time, New Bedford was an important manufacturing and shipping center, although its heyday as a whaling port was long past. The light station was designed by notable author, artist, and engineer F. Hopkinson Smith. Remarkably, the Butler Flats Light Station had only two keepers from the time of its construction in 1898 until the USCG assumed control of the Lighthouse Service in 1942. Capt. Amos Baker, Jr. served as keeper from 1898 until his death in 1911. His son, Charles A. Baker, served as assistant keeper from 1898 to 1911 and as keeper from 1911 to 1942. USCG keepers assumed operation of the light station

in 1942 and in 1975 a new automated light and fog signal were constructed on the nearby New Bedford hurricane barrier. The City of New Bedford acquired the light station in 1978 and it subsequently became one of the first solar-powered light stations in the nation (Tait et al., 1986; D'Entremont, 2021e).

3.9.3 NRHP Criteria and the Maritime Visual Setting

According to its NRHP nomination form, the Butler Flats Light Station meets NRHP Criteria A, B, and C for its association with the development of aids to navigation in Massachusetts and as an example of a caisson type lighthouse, and as the only lighthouse of its type designed by a known marine architect.

As stated above, the Butler Flats Light Station was constructed to replace Clark's Point Light to guide vessels to the mouth of the Acushnet River and New Bedford Harbor. The light station's offshore maritime setting is inextricably linked to its historic use and significance.

3.10 The Nobska Point Lighthouse

3.10.1 Physical Description and Existing Conditions

The Nobska Point Lighthouse is located high on a rocky promontory above the entrance to Woods Hole Harbor. It is a conical brick-lined cast iron tower with a cast iron lantern. Arched windows at the three lower levels feature pedimented hoods while the fourth level has porthole windows. The gallery below the lantern is supported on cast iron brackets. The entrance to the tower is via a small gable-roofed wood shingled vestibule. The keeper's house is a wood frame one-and-one-half-story gable-and-ell residence with wood shingle siding. The adjoining assistant keeper's residence is of similar form and materials but smaller proportions. A brick oil house and a brick radio beacon building are also present on the site (Tait et al., 1986).

3.10.2 Historic Context

The first lighthouse at Nobska Point was completed in 1828. It was replaced with the current tower and keeper's house in 1876. An assistant keeper's house was added in 1900. The light was electrified in 1919. It was staffed by civilian keepers until 1972 and finally automated in 1985, when it became the residence of the Commander of the USCG South East Sector New England. The last Commander to reside at Nobska Point moved out in 2013 and the USCG transferred ownership of the property to the Town of Falmouth. The Friends of Nobska Point Light maintains the property and began a major restoration in 2017 (Tait et al., 1986; Friends of Nobska Light, 2021).

3.10.3 NRHP Criteria and the Maritime Visual Setting

The Nobska Point Lighthouse meets NRHP Criteria A and C for its association with the development of aids to navigation in Massachusetts and as an excellent example of an intact lighthouse complex including the tower, keepers' residences, and ancillary buildings. The property's scenic qualities and dramatic setting above Woods Hole Harbor are noted in the NRHP nomination.

As stated above, the Nobska Point Lighthouse is located high on a rocky promontory above the entrance to Woods Hole Harbor between Buzzard's Bay and Vineyard Sound. Its location allows for the light to be seen in all directions (Tait et al., 1986). As Falmouth was a major whaling port in the nineteenth century, the addition of a lighthouse to assist vessels traveling in and out of Woods Hole Harbor was essential. According to the *History of Nobska Point Lighthouse, Woods Hole, Massachusetts,* more than 10,000 vessels passed through the area when the lighthouse was constructed in 1829 (D'Entremont, 2021h). In 1888, after the lighthouse had been replaced in 1876, the lens was updated with "a red sector to warn mariners of the dangerous L'Hommedieu and Hedge Fence shoals" (D'Entremont, 2021h).

4.0 MITIGATION MEASURES

Mitigation measures at the historic properties are detailed in this section. These applicant-proposed mitigation measures were developed on behalf of Revolution Wind by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61) and are appropriate to fully address the nature, scope, size, and magnitude of adverse effects including cumulative effects caused by the Project, NRHP-qualifying characteristics of each historic property that would be affected. These mitigation measures also include actions to respond to some reasonably foreseeable hazards unrelated to the Project that pose risks to the long-term preservation of affected historic properties, such as climate change. Revolution Wind has prepared this draft HPTP for inclusion in the DEIS and subsequent review, revision and refinement by consulting parties.

4.1 Assessment, Planning, Restoration, and Institutional Development

4.1.1 Purpose and Intended Outcome

The eight historic lighthouses addressed in this HPTP each have a unique set of needs for physical repair and maintenance, hazard mitigation, interpretation, and, for some, institutional development for their non-profit owners or caretaking organizations. Funding will be provided to support the prioritized needs of each of the lighthouses. Consultation with the Participating Parties will determine the exact scope of work for each of these historic properties; however, the intent of this mitigation measure is to provide funding for assessment, planning, and institutional development to enhance the long-term preservation, resiliency, and interpretation of the historic properties and will help preserve the character of existing historic shoreline settings.

4.1.2 Scope of Work

The scope of work for each historic lighthouse will be determined in consultation with the Participating Parties, and in compliance with applicable standards (see Section 4.1.4).

4.1.3 Methodology

Revolution Wind will release a request for proposals (RFP) for consultant services for the scope of work identified for each historic lighthouse and select a consultant to perform the scope of work by qualified consultants, contractors, or other professionals. Any draft documentation (e.g., exhibit materials, plans and specifications, reports) will be developed in consultation with the Participating Parties and will be distributed for review and comment. Final deliverables will incorporate comments received and will be distributed to the Participating Parties, as applicable. Prior to any work, existing condition documentation, including photographs will be completed and distributed to the Participating Parties. Upon completion of any work, as-built documentation, including photographs will be completed and distributed to the Participating Parties.

4.1.4 Standards

The project will comply with following standards, as applicable:

- Applicable state and local building codes, guidance and regulations;
- All existing preservation restrictions and/or easements (see Section 2.2.2);
- *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving their Character* (Nelson, 1988);
- *Preservation Brief 47: Maintaining the Exterior of Small and Medium Size Historic Buildings;*
- *National Register Bulletin 34: Guidelines for Evaluating and Documenting Historic Aids to Navigation;*
- *Historic Lighthouse Preservation Handbook;*
- *IALA-AISM Lighthouse Conservation Manual;*
- The Secretary of the Interior's *Professional Qualifications Standards* (36 CFR Part 61), as applicable; and
- The Secretary of the Interior's *Standards for Treatment of Historic Properties* (36 CFR 68).

4.1.5 Documentation

The following documentation is to be provided for review by the Participating Parties:

- RFPs;
- Proposals by qualified consultants in response to the RFP;
- Photographs and documentation of existing conditions, as applicable;
- Draft deliverables;
- Final deliverables; and
- As-built documentation and photography, as applicable.

4.1.6 Funds and Accounting

Funding amounts will be determined following BOEM's release of their findings of adverse effects and consulting party review of the draft HPTP and the DEIS. The final version of the HPTP will include specifics concerning funding amounts and the mechanisms for funding the mitigation measures.

5.0 IMPLEMENTATION

5.1 Timeline

The timeline for implementation of the mitigation measures will be determined in consultation with the Participating Parties based on the agreed upon mitigation measures described in the final version of this HPTP. This HPTP will be reviewed by and further developed in consultation with Participating Parties concurrent with BOEM's NEPA substitution schedule[3] for RWF, which is currently anticipated to include the following:

- **May 3, 2022 to July 1, 2022** – Distribution of the Finding of Effect document, on historic properties, to consulting parties (to occur between).
- **May 3, 2022 to August 1, 2022** – 30-day comment period on the Finding of Effect document (to occur between).
- **September 2, 2022** – Distribution of the Draft Memorandum of Agreement (MOA) and the Draft Environmental Impact Statement (DEIS) to consulting parties.
- **September 2, 2022 to October 17, 2022** – 45-day comment period by consulting parties on the MOA and DEIS
- **October 18, 2022 to December 19, 2022** – Distribution of the revised MOA to consulting parties (to occur between).
- **October 18, 2022 to January 19, 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **December 2022 to February 2023** – Distribution of the revised MOA to consulting parties (to occur between).
- **December 2023 to March 2023** – 30-day comment period on the revised MOA (to be determined for a 30-day period between).
- **February 2023 to April 2023** – Distribution of the Final MOA to consulting parties (to occur between).
- **March 2023 to June 2, 2023** – 30-day signing period for consulting parties (to begin no later than a date between).
- **June 2, 2023** – Release of Final Environmental Impact Statement (FEIS).
- **June 2, 2023 to July 3, 2023** – 30-day review period for the FEIS.
- **July 7, 2023** – NEPA Record of Decision (ROD) issued by BOEM.

The final version of this HPTP included in the FEIS will include a timeline for implementation of the final/agreed upon mitigation measures described herein. It is anticipated that the mitigation measure identified in Section 4.0 will commence within 2 years of the execution of the MOA unless otherwise agreed by the consulting parties and accepted by BOEM. Per Section 4.0, the Participating Parties will have a minimum of 30-days to review and comment on all draft reports or other work products developed for this HPTP. Revolution Wind assumes that the proposed scope of work will be completed within 5 years of the

[3] The timeline is subject to change and is based on current available information.

execution of the MOA unless a different timeline is agreed upon by consulting parties and accepted by BOEM.

5.2 Organizational Responsibilities

5.2.1 Bureau of Ocean Energy Management (BOEM)

BOEM remains responsible for making all federal decisions and determining compliance with Section 106. BOEM has reviewed this HPTP to ensure, at minimum, it includes the content required.

- BOEM remains responsible for making all federal decisions and determining compliance with Section 106;
- BOEM, in consultation with the Participating Parties, will ensure that mitigation measures adequately resolve adverse effects, consistent with the NHPA;
- BOEM must accept the final HPTP before Revolution Wind may commence any of the actions included in the HPTP;
- BOEM will be responsible for sharing the annual summary report with Participating Parties; and
- BOEM is responsible for consultation related to dispute resolution.

5.2.2 Revolution Wind, LLC

Revolution Wind will be responsible for the following:

- Considering the comments provided by the Participating Parties in the development of this HPTP;
- Funding the mitigation measures specified in Section 4.0;
- Completion of the scope/s of work in Section 4.0;
- Ensuring all Standards in Section 4.0 are met;
- Providing the Documentation in Section 4.0 to the Participating Parties for review and comment;
- Annual Reporting to BOEM; and
- Revolution Wind will be responsible for ensuring that all work that requires consultation with Tribal Nations are performed by professionals who have demonstrated professional experience consulting with federally recognized Tribes.

5.2.3 Other Parties, as Appropriate

Revolution Wind does not anticipate additional consulting parties, should any be determined, this will be updated.

5.3 Participating Party Consultation

Revolution Wind has provided this draft HPTP to BOEM for inclusion in the DEIS for review by Participating Parties to provide meaningful input on the resolution of adverse effects to and form(s) of implementing mitigation at the historic properties. As part of the development of this draft HPTP, Revolution Wind has conducted targeted outreach with the Participating Parties identified in Section 2.3. As of July 2022, this outreach has included the following:

- Stakeholder Consultation Meeting to Review Avoidance, Minimization, and Mitigation Measures for the Revolution Wind Farm – Lighthouses, February 17, 2022.

Participating Parties will be provided opportunity for review and comment on the HPTP concurrent with BOEM's anticipated NEPA substitution schedule for Revolution Wind Farm (see Section 5.1). It is anticipated that subsequent coordination to further refine the HPTP may include meetings, conference calls, HPTP draft reviews and document exchanges, or similar means of communication of information. BOEM will be invited to participate in these consultations between Revolution Wind and the Participating Parties regarding revision and refinement of this HPTP, should it choose.

6.0 REFERENCES

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ATTACHMENT 28 – REVOLUTION WIND EXPORT CABLE ONSHORE SUBSTATION AND INTERCONNECTION FACILITY, NORTH KINGSTOWN, RHODE ISLAND: PROCEDURES GUIDING THE DISCOVERY OF UNANTICIPATED CULTURAL RESOURCES AND HUMAN REMAINS

[Insert ATTACHMENT 28 – REVOLUTION WIND TERRESTRIAL UNANTICIPATED DISCOVERY PLAN]

DRAFT

Public Archaeology Laboratory

Revolution Wind Export Cable Onshore Substation and Interconnection Facility

North Kingstown, Rhode Island

Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains

July 2022

Revolution Wind, LLC (Revolution Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the Revolution Wind Farm Project (Project). The wind farm portion of the Project will be located in federal waters on the Outer Continental Shelf (OCS) in the designated Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486. The Project also includes up to two submarine export cables (RWEC), generally co-located within a single corridor through both federal waters and state waters of Rhode Island. The RWEC will make landfall at Quonset Point in North Kingstown, Rhode Island and will interconnect to an existing electric transmission system via the Davisville Substation, which is owned and operated by The Narragansett Electric Company (TNEC), located in North Kingstown, Rhode Island.

Revolution Wind is committed to the protection and preservation of cultural resources, in accordance with federal and state legislation, and is continuing that commitment as part of the onshore components of the Project. Revolution Wind recognizes that despite intensive cultural resource field investigations that were performed in the spring and summer of 2021 (Forrest and Waller 2021), it is nonetheless possible that potentially significant archaeological resources could be discovered during onshore Project construction, particularly during excavation. Revolution Wind also recognizes the requirement for compliance with federal, state, and municipal laws and regulations regarding the treatment of human remains, if any are discovered.

The procedures guiding the unanticipated discovery of cultural resources and human remains detailed herein ("Procedures") were developed on behalf of Revolution Wind and in consultation with the Rhode Island Historical Preservation and Heritage Commission (RIHPHC)/office of the State Historic Preservation Officer (SHPO), and federally recognized Native American tribes. These Procedures summarize the approach that Revolution Wind will use to address any unanticipated discoveries of archaeological resources or human remains during construction activities within the onshore portion of the Project's area of potential effect (APE).

The purpose of archaeological investigations is to determine the presence or absence of historic properties, including archaeological sites, within a project APE. These archaeological investigations are conducted in accordance with standards set forth in Section 106 of the National Historic Preservation Act of 1966, as amended, (54 USC 36018) and its implementing regulations (36 CFR 800), specifically, those procedures regarding "post-review discoveries" as outlined in 36 CFR 800.13. All work is undertaken pursuant to the Secretary of the Interior *Standards for Archaeology and Historic Preservation* (48 FR 44716-44742); the *Performance Standards and Guidelines for Archaeology in Rhode Island* (RIHPHC 2021); and the applicable laws and regulations pertaining to

the cultural resources and human remains including the Rhode Island Historical Cemeteries Act (Rhode Island General Law [R.I.G.L.] 23-18-11 *et seq*.) and the Antiquities Act of Rhode Island (R.I.G.L. 42–45.1).

Cultural Sensitivity Training

Revolution Wind acknowledges the sensitivity of the Project and surrounding area to potentially contain significant archaeological sites including Native American burials. The Public Archaeology Laboratory Inc. (PAL) Principal Investigator will give Revolution Wind and its contractor construction supervisors cultural and archaeological sensitivity training before the start of construction. The purpose of this training will be to review Revolution Wind's commitments to cultural resource compliance, review the general results of the archaeological investigations conducted within the onshore portions of the Project APE, and to provide an overview of the general cultural history of the area so that Revolution Wind and their contractors are aware of the types of archaeological resources that may be encountered during construction. The training program will outline the procedures that will be followed if a significant cultural resource or archaeological deposit is discovered during construction.

Notification Procedures

The identification of archaeological resources requires experience in recognizing and identifying potentially and significant archaeological sites and deposits. Revolution Wind is committed to having qualified archaeological monitors onsite during any ground disturbing construction activities. Revolution Wind will provide the Narragansett Indian Tribe, the Wampanoag Tribe of Gay Head/Aquinnah, Mashpee Wampanoag Tribe, the Mohegan Tribe, the Shinnecock Indian Nation, the Delaware Tribe of Indians, the Delaware Nation, and the Mashantucket Pequot Tribal Nation Tribal Historic Preservation Offices (THPOs) the opportunity to have their tribal monitors and cultural resource specialists onsite during archaeological or construction activities.

The following details the plan that Revolution Wind and their contractors will follow if archaeological resources or human remains are identified during construction.

During Construction

Archaeological Discoveries

1. Possible archaeological remains may be discovered by archaeological and tribal monitors during construction. If anyone including construction personnel identify suspected cultural or archaeological resources, the archaeologist on site should immediately be notified such that the qualified archaeological monitor can issue a stop-work order. If suspected artifacts or archaeological features are uncovered during a construction activity, qualified archaeological monitors will have the authority to stop work in the vicinity of the discovery until it can be determined if the materials are cultural and whether they represent a potentially significant site or archaeological deposit.

2. Archaeological monitors will immediately notify Revolution Wind's Environmental Compliance Manager. Notification will include the activity, specific work area including location/address and construction site (onshore substation, interconnection facility, export cable route, etc.), and provide digital photographs of the find.

3. Revolution Wind will issue a Stop Work order and direct the contractor to secure the area by flagging or fencing off the area of the archaeological discovery. Any discovery made on a weekend or overnight hours will be protected until all necessary parties have been notified of the discovery. The contractor will not resume work in the vicinity of the find until Revolution Wind's Environmental Compliance Manager has granted clearance.

4. PAL, in consultation with the onsite tribal monitors, will determine if the site is potentially significant and notify the RIHPHC and BOEM. Revolution Wind, their contractors, and PAL will work with the RIHPHC and the THPOs to develop and implement a site treatment plan.

5. Since the area of any potential discovery will have been partially disturbed by construction, the objective of cultural resource investigations will be to evaluate data quickly so that notifications are made and consultation can proceed. If archaeological investigations are required, Revolution Wind will inform the construction supervisor that no construction work in the immediate vicinity of the discovery can proceed until archaeological fieldwork is complete. The area will be flagged as being off-limits for work but will not be identified as an archaeological site *per se* to protect the resource(s).

6. The duration of any work stoppages will be contingent upon the significance of the identified cultural resource(s) and consultation among Revolution Wind, BOEM, RIHPHC, THPOs, and other parties to determine treatment to avoid, minimize, or mitigate any adverse effects to the identified site.

7. Once all treatment measures are complete, Revolution Wind will notify the contractor that construction work may proceed.

Human Remains Discoveries

If human remains are encountered during Project construction, they will be handled in accordance with the Rhode Island Historic Cemeteries Act (Appendix A) and North Kingstown Code of Ordinances, Part III, Chapter 12, Section 12–15 (Appendix B) and guided by the policy statement adopted by the Advisory Council on Historic Preservation ([Advisory Council]; see *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*, (Appendix C). Human remains, if present, are likely to be found in deeply buried or areas unimpacted by previous construction.

Human remains will be treated with the utmost dignity and respect at all times. Skeletal remains and/or associated artifacts will be left in place and not disturbed. No remains or associated materials will be collected or removed until all notifications have been made, appropriate consultation has taken place, and a plan of action has been determined. The procedures that will be followed in the event that human remains are discovered during Project construction are:

1. If PAL and/or tribal monitors identify human remains or possible human remains, all construction work in the vicinity of the find that could affect the integrity of the remains will cease. The remains will not be touched, moved, or further disturbed. PAL will notify Revolution Wind and with the assistance of onsite contractors take measures to ensure site security.

2. PAL/Revolution Wind will record the exact location of the find, its time of discovery, and will immediately notify the RI State Police and the Town of North Kingstown's Building Inspector in accordance with Rhode Island Historic Cemeteries Act and the North Kingstown Code of Ordinances. BOEM will also be notified as soon as practicable.

3. The Town will notify the Office of the State Medical Examiner (OSME). If the OSME determines the remains are less than 100 years old, then their treatment becomes the responsibility of the State Police and the Town. If the OSME determines the remains are more than 100 years old, the OCME will notify the RIHPHC State Archaeologist. The State Archaeologist, PAL and tribal monitors will determine if the remains are Native American.

4. The Town of North Kingstown, State Archaeologist, and if the remains are Native American, the THPOs will discuss whether there are prudent and feasible alternatives to protect the remains. The results of this consultation will be made in writing. If it is not possible to protect the remains, they may be excavated only under a permit issued by the RIHPHC after the review of a recovery plan that specifies a qualified research team, research design, and plan for the disposition of the remains consistent with the results of consultation and permission from the North Kingstown Town Council.

5. In all cases, due care will be taken in the excavation, transport, and storage of any remains to ensure their security and respectful treatment.

Applicable Laws

Federal

- Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC 306108) and its implementing regulations “Protection of Historic Properties” (36 CFR part 800).

Rhode Island

- Rhode Island Historic Cemeteries Act: Rhode Island General Law 23-18-11 *et seq*. (Appendix A)

North Kingstown

- North Kingstown Code of Ordinances, Part III, Chapter 12, Section 12–15 (Appendix B)

LIST OF CONTACTS

Revolution Wind, LLC
56 Exchange Terrace, Suite 300
Providence, Rhode Island 02903
Contact :James Neveu, Environmental Compliance Manager
Tel: (857) 210-9152
Email: JANEV@orsted.com

Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road
VAM-OREP
Sterling, Virginia 20166
Contact: Laura Schnitzer, Archaeologist
Email: laura.schnitzer@boem.gov

Rhode Island Historical Preservation and Heritage Commission
150 Benefit Street
Providence, RI 02903-1209
Contact: Dr. Timothy Ives, Principal Archaeologist
Tel: (401) 222-4139
Email: timothy.ives@preservation.ri.gov

Charlotte Taylor, Principal Archaeologist
Tel: (401) 222-4140
Email: Charlotte.Taylor@preservation.ri.gov

Jeffry Emidy, Interim Executive Director, Deputy State Historic Preservation Officer
Tel: 401) 222-4134
Email: Jeffrey.Emidy@preservation.ri.gov

Rhode Island Department of Health/Office of the State Medical Examiners
48 Orms Street
Providence, RI 02904
Contact: Tel: 401-222-5500

Rhode Island State Police, Wickford Barracks
7875 Post Road
North Kingstown, RI 02852
Contact: Tel: (401) 444-1064

North Kingstown Police Department
8166 Post Road
North Kingstown, RI 02852
Contact: Tel: (401) 294-3316

The Public Archaeology Laboratory, Inc.
26 Main Street
Pawtucket, RI 02860
Contact: Deborah Cox

TRIBAL HISTORIC PRESERVATION OFFICES

Narragansett Indian Tribe Tribal Historic Preservation Office
Post Office Box 268
Charlestown, RI 02813
Contact: John Brown, III, Tribal Historic Preservation Officer
Tel: (401) 585-0142
Email: tashtesook@aol.com

Mashantucket Pequot Tribal Nation Tribal Historic Preservation Office
Indiantown Rd. PO Box 3060
Mashantucket, CT 06338-3060
Contact: Michael Kicking Bear Johnson, acting Tribal Historic Preservation Officer
Tel: (860) 396-7575
Email: mejohnson@mptn-nsn.gov

Mashpee Wampanoag Tribe Tribal Historic Preservation Office
483 Great Neck Road South
Mashpee, MA 02649
Contact: David Weeden, Tribal Historic Preservation Officer
Tel: (508) 477-0208, Ext. 102
Email: David.weeden@mwtribe-nsn.gov

Mohegan Tribe Tribal Historic Preservation Office
13 Crow Hill Road
Uncasville, CT 06382
Contact: James Quinn, Tribal Historic Preservation Officer
Tel: (860) 862-6893
Email: jquinn@moheganmail.com

Shinnecock Indian Nation Tribal Historic Preservation Office
P.O. Box 5006
Southampton, NY 11969-5006
Contact: Jeremy Dennis, Tribal Historic Preservation Officer
Tel: (631) 566-0486
Email: jeremynative@gmail.com

Wampanoag Tribe of Gay Head/Aquinnah Tribal Historic Preservation Office
20 Black Brook Road
Aquinnah, MA 02535-1546
Contact: Bettina Washington, Tribal Historic Preservation Officer
Tel: (508) 560-9014
Email: bettina@wampanoagtribe.net

Delaware Tribe of Indians Tribal Historic Preservation Office (PA)
126 University Circle
Stroud Hall, Rm. 437
East Stroudsburg PA 18301
Contact: Susan Bachor, Deputy Tribal Historic Preservation Officer
Tel: (610) 761-7452
Email: sbachor@delawaretribe.onmicrosoft.com

Delaware Nation Tribal Historic Preservation Office
P.O. Box 825
Anadarko, OK 73005
Contact: Carissa Speck, Historic Preservation Director
Tel: (405) 247-2488 Ext 1403
Email: cspeck@delawarenation-nsn.gov

APPENDIX A: RHODE ISLAND GENERAL LAWS TITLE 23 - HEALTH AND SAFETY - CHAPTER 23-18 CEMETERIES

SECTION 23-18-11

§ 23-18-11 Regulation of excavation around cemeteries. – (a) The city or town council of any municipality may by ordinance prescribe standards regulating any construction or excavation in the city or town, when those standards are reasonably necessary to prevent deterioration of or damage to any cemetery or burial ground, or to any structures or gravesites located in any cemetery or burial ground. The rules and regulations shall not apply to the ordinary installation of gravesites or of monuments, markers, or mausoleums.

(b) No city or town shall permit construction, excavation or other ground disturbing activity within twenty-five feet (25') of a recorded historic cemetery except in compliance with the following provisions:

(1) The boundaries of the cemetery are adequately documented and there is no reason to believe additional graves exist outside the recorded cemetery and the proposed construction or excavation activity will not damage or destructively alter the historic cemetery through erosion, flooding, filling, or encroachment; or

(2) The proposed construction or excavation activity has been reviewed and approved by the city or town in accordance with § 23-18-11.1.

(c) Whenever an unmarked cemetery or human skeletal material is inadvertently located during any construction, excavation, or other ground disturbing activity, including archaeological excavation, the building official of the city or town where the unmarked cemetery or human skeletal material is located shall be immediately notified. The building official shall, in turn, notify the state medical examiner and the Rhode Island historical preservation and heritage commission if the grave, cemetery, or skeletal material appears to be historic. Prior to the continuation of any further construction, excavation, or other ground disturbing activity, and unless the provisions of § 23-18-7 shall apply, the property owner shall undertake an archaeological investigation to determine the boundaries of the unmarked cemetery and shall so inform the building official. In the event that the cemetery meets the criteria for a historic cemetery, the building official shall so advise the recorder of deeds of the city or town who shall record and register the cemetery in accordance with the provisions of § 23-18-10.1.

SECTION 23-18-11.1

§ 23-18-11.1 Permit required to alter or remove historic cemetery – Powers of city or town council – Appeal. – (a) Before an agency or a property owner may authorize or commence alteration or removal of any historic cemetery, the agency or owner must apply to the city or town council where the historic cemetery is located for a permit to alter or remove. The city or town council shall prescribe by ordinance standards to regulate the alteration or removal of any historic cemetery within its municipal limits, but shall at a minimum provide that:

(1) The applicant will examine all alternatives, and demonstrate that no prudent or feasible alternative to the proposed alteration is possible;

(2) The city or town provide for notification and participation in the permitting process of parties which may be interested in the proposed alteration or removal by virtue of their status as a governmental health or historic preservation authority, or as a private or nonprofit historical, genealogical or civic

organization, or, in the case of American Indian cemeteries and burial grounds, the appropriate tribal organization; and
(3) The city or town provide for due consideration of the rights of descendants in any application to substantially alter or remove a historic cemetery.

(b) When an application for alteration or removal of a historic cemetery has been made and the boundary is unknown or in doubt, the city or town may require that the applicant, at its own expense, conduct an archaeological investigation to determine the actual size of the cemetery prior to final consideration by the city or town of the application to alter or remove.

(c) After due consideration, the city or town council may grant the application to alter or remove the historic cemetery in whole or in part, under the supervision of an archaeologist and with any restrictions and stipulations that it deems necessary to effectuate the purposes of this section, or deny the application in its entirety. Any person or persons aggrieved by a decision of the city or town council shall have the right of appeal concerning the decision to the superior court and from the superior court to the supreme court by writ of certiorari.

(d) Nothing in this section shall be deemed to contravene the authority of municipal bodies under § 45-5-12 to hold, manage, repair, or maintain any neglected burial ground.

SECTION 23-18-11.2

§ 23-18-11.2 Regulation of excavation – Removal and transfer of graves and cemeteries – Penalties. – (a) The city or town council of any municipality may by ordinance prescribe standards, in addition to those required by § 23-18-10, regulating the excavation, removal, and transfer of any graves, grave sites, and cemeteries in the municipality so as to provide an accurate record of any activity and to ensure that any remains removed are properly re-interred and the location of the new interment is recorded. In the absence of a local ordinance establishing standards, regulations adopted by the historical preservation and heritage commission shall govern. A report of any grave removal and relocation from one cemetery or burial ground to another shall be filed in the clerk's office for each municipality and shall, to the extent permitted by law, be available for public inspection. In instances where there is a headstone or other burial marker identifying the original grave, the headstone or burial marker shall be erected on the site to which any remains are transferred.

(b) To the extent not promulgated pursuant to § 23-3-5.1, the state registrar of vital records shall promulgate regulations to establish a system of record-keeping to allow descendants to locate their ancestors' graves in Rhode Island.

(c) Any person convicted of violating this section shall be subject to a fine of not more than one thousand dollars ($1,000) and such fine shall be deemed civil in nature and not a criminal penalty.

(d) The provisions of this section shall be considered to be in addition to any other penalties provided for desecration or vandalism to cemeteries.

SECTION 23-18-13

§ 23-18-13 Notification of historical preservation and heritage commission. – The historical preservation and heritage commission shall be notified whenever an ancient burial place contains or is suspected to contain the remains of one or more persons.

APPENDIX B: NORTH KINGSTOWN CODE OF ORDINANCES, PART III, CHAPTER 12, SECTION 12-15 – HISTORICAL AND ARCHAEOLOGICAL BURIAL SITES

a) *Authority*. In compliance with RIGL 1956, § 23-18-1 et seq., the town adopts this section to govern the preservation of historic and archaeological burial sites in the town.
b) *Purpose.* The town council recognizes that historic and archeological gravesites possess archaeological and scientific value and are often of great artistic, cultural and religious significance and represent for all cultures a respect for the sanctity of human life. It is, therefore, the policy of the town that marked or unmarked historic cemeteries are to be preserved and are not to be altered or removed except as provided for in this section.
c) *Definitions*. The following words, terms and phrases, when used in this section, shall have the meanings ascribed to them in this subsection, except where the context clearly indicates a different meaning:

Applicant means the owner of the land on which an archeological burial site or family cemetery is located for which a permit must be sought for alteration or removal.

Archaeological burial site means an area of land which has been designated and/or used for the interment of human remains in the prehistoric or distant past. Archaeological burial sites may include American Indian or other ethnic groupings.

Family cemetery means a historic cemetery which is not associated with a specific religious organization but which is the site of burial for persons related by blood, marriage or household.

Historic cemetery means any tract of land which has been used for a period in excess of 100 years as a burial place, whether or not marked with a historic marker or gravestone, including but not limited to ancient burial places known to contain the remains of one or more American Indians. For the purposes of this section, the term "historic cemetery" also includes an area 25 feet in width around the perimeter of the cemetery.

Human remains means any parts or remains of deceased persons including skeletal remains or cremated ashes.

Grave means any site where human remains have been purposefully interred. The term also includes gravemarkers, funerary objects and associated cultural remains and artifacts. A grave includes mausoleums, crypts or other structures designed to house human remains.

Least disruptive means means a means of construction, excavation, removal or other activity which, in the opinion of the state historic preservation commission, has the least overall destructive impact on the grave, human remains or cemetery.

Owner means the owner of a parcel of land.

Religious cemetery means any cemetery owned or maintained by a religious organization.

Religious organization means the organization representing the adherents of any religious society.

Site alteration plan means a document showing in written text and by illustration the proposed alteration of a historic cemetery, an archaeological burial site or a family cemetery, including detailed specifications for alteration, removal and reinterment of human remains.

Town means the town, its agents or its officers.

d) Procedures. Procedures regarding disturbance of historic cemeteries or archaeological burial sites shall be as follows:

1) It shall be unlawful for any person to disturb, disrupt, excavate, deposit, fill in or on, remove or destroy gravemarkers, burial objects or buried human remains or conduct any other activities that would damage or diminish the integrity of any historic cemetery or archaeological burial site or family cemetery without first obtaining a permit to alter or remove such historic cemetery, archaeological burial site or family cemetery from the town council.

2) Once a discovery of a previously unknown burial site is made, the owner or contractor shall immediately notify the building inspector who in turn shall contact the state medical examiner and state historical preservation commission pursuant to RIGL 1956, § 23-18-1 et seq.

3) The town shall require the cessation of construction activities pending preliminary verification of the property as a human burial site by the state medical examiner or historic preservation commission. If the site is verified as a human burial site, work within 25 feet of the site shall be halted unless or until a permit to alter or remove is issued by the town pursuant to this section.

4) The owner shall be required, at the owner's expense, to conduct an archaeological investigation of the area to establish the boundaries of the cemetery/burial site using the least disruptive means feasible. The least disruptive means shall be determined by the town through the town's consultation with the state historic preservation commission (RIHPC). A survey report shall be produced incorporating the findings of the investigation in test and graphic form.

5) The applicant shall then submit the report and a detailed engineering plan, as required and identified in subsection (d)(8)a of this section of the proposed construction project and all other proposed activities on the property that in any manner might lead to or necessitate any disruption of the cemetery/burial site.

6) The applicant shall also submit a detailed site alteration plan proposal of the extent and method of removal of human remains and a reburial plan in text and drawing of the new gravesite.

7) The town council may issue a permit to allow the alteration or removal of historic cemeteries, archaeological cemeteries or family cemeteries only after concluding, based on evidence submitted to the council at a public hearing, that all alternatives to the proposed activity have been examined and that no prudent and feasible alternative to the proposed activity exists or that the alteration serves the interests, health, welfare and safety of the public and is not solely for commercial expediency.

8) The applicant shall submit the following to the town council prior to the consideration of any application for a permit to remove and/or alter a historic cemetery or an archaeological burial site:

   a. Detailed site plans drawn to scale by a licensed professional registered land surveyor or professional engineer, as applicable, at a minimum scale of 1″=50′, showing the boundaries of the property in question, topographical contour intervals of no more than one foot, a surveyed boundary of the cemetery and a setback area of no less than 25 feet, and a proposed plan of all improvements proposed on the site that would necessitate disturbance of the cemetery.

b. If known, a written description of the cemetery, its age and condition, and historical importance; whether the cemetery is religious, family, organization, publicly owned or other kind of cemetery; a listing of names and vital dates of those interred as may be determined from gravemarkers on site; and a cemetery plan indicating position of graves and to the extent possible the identities of those interred.

c. A detailed site alteration plan indicating the extent of disruption of the cemetery, methods of construction or removal of human remains, reburial plan, including in text and illustration the relocation of graves.

d. If a family cemetery, a genealogical study to identify whether decedents of the families of the interred still reside in the state.

e. If a religious cemetery, a listing of the religious organization that owns or maintains the cemetery.

f. Any further information and study the town council deems necessary to complete its consideration of the request to alter a cemetery in compliance with RIGL 1956, § 23-18-1 et seq.

e) *Hearing.* A hearing shall be conducted in accordance with the following:

1) *Public notice*. Once the required documents are submitted by an applicant and published, the town council shall set the date for a public hearing. Notice of the date, time and location of the public hearing shall be at the applicant's expense, in a local newspaper, for a period of not less than two weeks prior to the hearing. The state historic preservation commission shall be notified not less than two weeks prior to the scheduled hearing, and an advisory opinion shall be requested by pertinent town staff.

2) *Notice to interested parties.* Notice to interested parties shall be given as follows:

a. For archaeological burials and historic Native American graves, the town shall cause the tribal council of the Narragansett Tribe to be notified by regular mail of the subject, date and time of the scheduled hearing.

b. If an application involves the cemetery of an extant religious society, such society shall be so notified by regular mail of the scheduled hearing.

c. If the application involves a family cemetery, the interred of which have living lineal descendants, the applicant, at the applicant's expense, shall make all reasonable efforts to notify the lineal descendants as to the scheduled hearing, which efforts may include sending notice to the descendants via first class mail or publication of the notice in a newspaper of statewide circulation at least once per week for two successive weeks prior to the scheduled hearing.

3) *Burden of proof.* At the hearing, the applicant shall prove to the satisfaction of the town council that:

a. The applicant has examined all possible alternatives and conclusively demonstrated that no prudent and feasible alternative to the proposed alteration is possible; or

b. The proposed alteration serves the interests of health, welfare and safety of the public and is not solely for commercial expediency.

f) *Final action.* The town council shall conduct a public hearing on the proposed project and shall render a decision approving, denying or approving with reasonable conditions the proposed site alteration plan and may set other conditions and/or requirements necessary to carry out the purposes of RIGL 1956, § 23-18-1 et seq.

g) *Legal status.* Nothing in this section shall be construed to prohibit the routine maintenance and repair of historical gravesites or the use of historic cemeteries as places of interment, nor shall it be construed to preclude the town boards or commissions or agents from otherwise acting within their authority to regulate and protect historical and archaeological cemeteries.

h) *Severability.* If any subsection, clause, provision or portion of this section shall be held invalid or unconstitutional by a court of competent jurisdiction, such decision shall not affect the validity or constitutionality of any other subsection, clause, provision or portion of this section.

i) *Appeal.* Any person aggrieved by the decision of the town council shall have a right to appeal the decision to the superior court pursuant to RIGL 1956, § 23-18-11.1.

(Ord. No. 94-25, § 1, 11-14-1994)

Cross reference— Historical zoning, § 21-331 et seq.

State Law reference— Historical and archaeological burial sites, RIGL 1956, § 23-18-1 et seq.; historic burial sites, RIGL 1956, § 23-18-10.1; historic preservation, RIGL 1956, § 42-45-1 et seq.

APPENDIX B: ADVISORY COUNCIL ON HISTORIC PRESERVATION POLICY STATEMENT REGARDING TREATMENT OF BURIAL SITES, HUMAN REMAINS AND FUNERARY OBJECTS

Preserving America s Heritage

ADVISORY COUNCIL ON HISTORIC PRESERVATION

POLICY STATEMENT
REGARDING
TREATMENT OF BURIAL SITES, HUMAN REMAINS AND FUNERARY OBJECTS

Preamble: This policy offers leadership in resolving how to treat burial sites, human remains, and funerary objects in a respectful and sensitive manner while acknowledging public interest in the past. As such, this policy is designed to guide federal agencies in making decisions about the identification and treatment of burial sites, human remains, and funerary objects encountered in the Section 106 process, in those instances where federal or state law **does not prescribe a course of action**.

This policy applies to all federal agencies with undertakings that are subject to review under Section 106 of the National Historic Preservation Act (NHPA; 16 U.S.C. § 470f), and its implementing regulations (36 CFR Part 800). To be considered under Section 106, the burial site must be or be a part of a historic property, meaning that it is listed, or eligible for listing, in the National Register of Historic Places.

The Advisory Council on Historic Preservation (ACHP) encourages federal agencies to apply this policy throughout the Section 106 process, including during the identification of those historic properties. In order to identify historic properties, federal agencies must assess the historic significance of burial sites and apply the National Register criteria to determine whether a property is eligible. Burial sites may have several possible areas of significance, such as those that relate to religious and cultural significance, as well as those that relate to scientific significance that can provide important information about the past. This policy does not proscribe any area of significance for burial sites and recognizes that the assessment must be completed on a case-by-case basis through consultation.

The policy is not bound by geography, ethnicity, nationality, or religious belief, but applies to the treatment of all burial sites, human remains, and funerary objects encountered in the Section 106 process, as the treatment and disposition of these sites, remains, and objects are a human rights concern shared by all.

This policy also recognizes the unique legal relationship between the federal government and tribal governments as set forth in the Constitution of the United States, treaties, statutes and court decisions, and acknowledges that, frequently, the remains encountered in Section 106 review are of significance to Indian tribes.

Section 106 requires agencies to seek agreement with consulting parties on measures to avoid, minimize, or mitigate adverse effects to historic properties. Accordingly, and consistent with Section 106, this policy does not recommend a specific outcome from the consultation process. Rather, it focuses on issues and perspectives that federal agencies ought to consider when making their Section 106 decisions. In many cases, federal agencies will be bound by other applicable federal, tribal, state, or local laws that do

prescribe a specific outcome, such as the Native American Graves Protection and Repatriation Act (NAGPRA). The federal agency must identify and follow applicable laws and implement any prescribed outcomes.

For undertakings on federal and tribal land that encounter Native American or Native Hawaiian human remains and funerary objects, NAGPRA applies. NHPA and NAGPRA are separate and distinct laws, with separate and distinct implementing regulations and categories of parties that must be consulted.[1] Compliance with one of these laws does not mean or equal compliance with the other. Implementation of this policy and its principles does not, in any way, change, modify, detract or add to NAGPRA or other applicable laws.

Principles: When burial sites, human remains, or funerary objects will be or are likely to be encountered in the course of Section 106 review, a federal agency should adhere to the following principles:

Principle 1: Participants in the Section 106 process should treat all burial sites, human remains and funerary objects with dignity and respect.

Principle 2: Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.

Principle 3: Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.

Principle 4: Burial sites, human remains and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.

Principle 5: When human remains or funerary objects must be disinterred, they should be removed carefully, respectfully, and in a manner developed in consultation.

Principle 6: The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws**.**

Principle 7: Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be inadvertently discovered.

Principle 8: In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.

[1] The ACHP's publication *Consulting with Indian Tribes in the Section 106 Process* and the National Association of Tribal Historic Preservation Officers' publication *Tribal Consultation: Best Practices in Historic Preservation* provide additional guidance on this matter.

DISCUSSION:

Principle 1: Participants in the Section 106 process should treat all burial sites, human remains and funerary objects with dignity and respect.

Because the presence of human remains and funerary objects gives a historic property special importance as a burial site or cemetery, federal agencies need to consider fully the values associated with such sites. When working with human remains, the federal agency should maintain an appropriate deference for the dead and the funerary objects associated with them, and demonstrate respect for the customs and beliefs of those who may be descended from them.

Through consultation with descendants, culturally affiliated groups, descendant communities, and other parties, federal agencies should discuss and reach agreement on what constitutes respectful treatment.

Principle 2: Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.

Consultation is the hallmark of the Section 106 process. Federal agencies must make a "reasonable and good faith" effort to identify consulting parties and begin consultation early in project planning, after the federal agency determines it has an undertaking and prior to making decisions about project design, location, or scope.

The NHPA, the ACHP's regulations, and Presidential Executive Orders set out basic steps, standards, and criteria in the consultation process, including:

- Federal agencies have an obligation to seek out all consulting parties [36 CFR § 800.2(a)(4)], including the State Historic Preservation Officer (SHPO)/Tribal Historic Preservation Officer (THPO) [36 CFR § 800.3(c)].

- Federal agencies must acknowledge the sovereign status of Indian tribes [36 CFR § 800.2(c)(2)(ii)]. Federal agencies are required to consult with Indian tribes on a government-to-government basis in recognition of the unique legal relationship between federal and tribal governments, as set forth in the Constitution of the United States, treaties, statutes, court decisions, and executive orders and memoranda.

- Consultation on a government-to-government level with Indian tribes cannot be delegated to non-federal entities, such as applicants and contractors.

- Federal agencies should solicit tribal views in a manner that is sensitive to the governmental structures of the tribes, recognizing their desire to keep certain kinds of information confidential, and that tribal lines of communication may argue for federal agencies to provide extra time for the exchange of information.

- Properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined eligible for inclusion on the National Register [16 U.S.C. § 470a(d)(6)(A)], and federal agencies must consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to such historic properties [16 U.S.C. § 470a(d)(6)(B) and 36 CFR § 800.2(c)(2)(ii)(D)].

Principle 3: Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.

This principle reiterates existing legal requirements found in federal law, regulation and executive orders, and is consistent with positions that the ACHP has taken over the years to facilitate enfranchisement and promote broad participation in the Section 106 process. Federal agencies must consult with Indian tribes on a government-to-government basis because they are sovereign nations.

Indian tribes and Native Hawaiian organizations bring a special perspective on how a property possesses religious and cultural significance to them. Accordingly, federal agencies should utilize their expertise about, and religious and cultural connection to, burial sites, human remains, and associated funerary objects to inform decision-making in the Section 106 process.

Principle 4: Burial sites, human remains and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.

As a matter of practice, federal agencies should avoid impacting burial sites, human remains, and funerary objects as they carry out their undertakings. If impact to the burial site can be avoided, this policy does not compel federal agencies to remove human remains or funerary objects just so they can be documented.

As this policy advocates, federal agencies should always plan to avoid burial sites, human remains, and funerary objects altogether. When a federal agency determines, based on consultation with Section 106 participants, that avoidance of impact is not appropriate, the agency should minimize disturbance to such sites, remains, and objects. Accordingly, removal of human remains or funerary objects should occur only when other alternatives have been considered and rejected.

When a federal agency determines, based on consultation with Section 106 participants, that avoidance of impact is not appropriate, the agency should then consider any active steps it may take to preserve the burial site in place, perhaps through the intentional covering of the affected area, placement of markers, or granting of restrictive or other legal protections. In many cases, preservation in place may mean that, to the extent allowed by law, the locations of burial sites, human remains, and funerary objects should not be disclosed publicly. Alternatively and consistent with the Section 106 regulations [36 CFR § 800.5(a)(2)(vi)], natural deterioration of the remains may be the acceptable or preferred outcome of the consultation process.

Principle 5: When human remains or funerary objects must be disinterred, they should be removed carefully, respectfully, and in a manner developed in consultation.

When the federal agency decides that human remains or funerary objects must be disturbed, they should be removed respectfully and dealt with according to the plan developed by the federal agency in consultation. "Careful" disinterment means that those doing the work should have, or be supervised by people having, appropriate expertise in techniques for recognizing and disinterring human remains.

This policy does not endorse any specific treatment. However, federal agencies must make a reasonable and good faith effort to seek agreement through consultation before making its decision about how human remains and/or funerary objects shall be treated.

The plan for the disinterment and treatment of human remains and/or funerary objects should be negotiated by the federal agency during consultation on a case-by-case basis. However, the plan should provide for an accurate accounting of federal implementation. Depending on agreements reached through the Section 106 consultation process, disinterment may or may not include field recordation. In some instances, such recordation may be so abhorrent to consulting parties that the federal agency may decide it is inappropriate to carry it out. When dealing with Indian tribes, the federal agency must comply with its legal responsibilities regarding tribal consultation, including government-to-government and trust responsibilities, before concluding that human remains or funerary objects must be disinterred.

Principle 6: The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws.

Federal agencies are responsible for making final decisions in the Section 106 process [36 CFR § 800.2(a)]. The consultation and documentation that are appropriate and necessary to inform and support federal agency decisions in the Section 106 process are set forth in the ACHP's regulations [36 CFR Part 800].

Other laws, however, may affect federal decision-making regarding the treatment of burial sites human remains, and funerary objects. Undertakings located on federal or tribal lands, for example, are subject to the provisions of NAGPRA and the Archaeological Resources Protection Act (ARPA). When burial sites, human remains, or funerary objects are encountered on state and private lands, federal agencies must identify and follow state law when it applies. Section 106 agreement documents should take into account the requirements of any of these applicable laws.

Principle 7: Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be inadvertently discovered.

Encountering burial sites, human remains, or funerary objects during the initial efforts to identify historic properties is not unheard of. Accordingly, the federal agency must determine the scope of the identification effort in consultation with the SHPO/THPO, Indian tribes and Native Hawaiian

organizations, and others before any archaeological testing has begun [36 CFR § 800.4(a)] to ensure the full consideration of avoidance of impact to burial sites, human remains, and funerary objects.

The ACHP's regulations provide federal agencies with the preferred option of reaching an agreement ahead of time to govern the actions to be taken when historic properties are discovered during the implementation of an undertaking. In the absence of prior planning, when the undertaking has been approved and construction has begun, the ACHP's post-review discovery provision [36 CFR § 800.13] requires the federal agency to carry out several actions:

(1) make reasonable efforts to avoid, minimize, or mitigate adverse effects to such discovered historic properties;
(2) notify consulting parties (including Indian tribes and Native Hawaiian organizations that might attach religious and cultural significance to the affected property) and the ACHP within 48 hours of the agency's proposed course of action;
(3) take into account the recommendations received; and then
(4) carry out appropriate actions.

NAGPRA prescribes a specific course of action when Native American and Native Hawaiian human remains and funerary objects are discovered on federal or tribal lands in the absence of a plan—cessation of the activity, protection of the material, notification of various parties, consultation on a course of action and its implementation, and then continuation of the activity. However, adherence to the plan under Principle 5 would cause new discoveries to be considered "intentional excavations" under NAGPRA because a plan has already been developed, and can be immediately implemented. Agencies then could avoid the otherwise mandated 30 day cessation of work for "inadvertent discoveries."

Principle 8: In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.

Under the ACHP's regulations, "descendants" are not identified as consulting parties by right. However, federal agencies shall consult with Indian tribes and Native Hawaiian organizations that attach religious and cultural significance to burial sites, human remains and associated funerary objects, and be cognizant of their expertise in, and religious and cultural connection to, them. In addition, federal agencies should recognize a biological or cultural relationship and invite that individual or community to be a consulting party [36 CFR § 800.3(f)(3)].

When federal or state law does not direct disposition of human remains or funerary objects, or when there is disagreement among claimants, the process set out in NAGPRA may be instructive. In NAGPRA, the "ownership or control" of human remains and associated funerary objects lies with the following in descending order: specific lineal descendants; then tribe on whose tribal lands the items were discovered; then tribe with the closest cultural affiliation; and then tribe aboriginally occupying the land, or with the closest "cultural relationship" to the material.

Definitions Used for the Principles

- **Burial Site**: Any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which as a part of the death rite or ceremony of a culture, individual human remains are deposited [25 U.S.C. 3001.2(1)].
- **Consultation:** The process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 review process [36 CFR § 800.16(f)].
- **Consulting parties:** Persons or groups the federal agency consults with during the Section 106 process. They may include the State Historic Preservation Officer; the Tribal Historic Preservation Officer; Indian tribes and Native Hawaiian organizations; representatives of local governments; applicants for federal assistance, permits, licenses, and other approvals; and/or any additional consulting parties [based on 36 CFR § 800.2(c)]. Additional consulting parties may include individuals and organizations with a demonstrated interest in the undertaking due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties [36 CFR § 800.2(c)(6)].
- **Disturbance:** Disturbance of burial sites that are listed in or eligible for listing in the National Register of Historic Places will constitute an adverse effect under Section 106. An adverse effect occurs when "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, setting, materials, workmanship, feeling, or association" [36 CFR § 800.5(a)(1)].
- **Federal land:** Lands under a federal agency's control. Mere federal funding or permitting of a project does not turn an otherwise non-federal land into federal land (see *Abenaki Nation of Mississquoi* v. *Hughes*, 805 F. Supp. 234 (D. Vt. 1992), aff'd, 990 F. 2d 729 (2d Cir. 1993) (where the court found that a Clean Water Act permit issued by the US Army Corps of Engineers did not place the relevant land under federal "control" for NAGPRA purposes).
- **Funerary objects:** "items that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains" [25 U.S.C. 3001(3)(B)].
- **Historic property:** "Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. It includes artifacts, records, and remains that are related to and located within such properties, and it includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria" [36 CFR § 800.16(1)].
- **Human remains:** The physical remains of a human body. The term does not include remains or portions of remains that may reasonably be determined to have been freely given or naturally shed by the individual from whose body they were obtained, such as hair made into ropes or nets [see 43 CFR § 10.2(d)(1)].
- **Indian Tribe**: "An Indian tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation or Village Corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act [43 U.S.C. 1602], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians" [36 CFR § 800.16(m)].
- **Native American:** Of, or relating to, a tribe, people, or culture that is indigenous to the United States [25 U.S.C. 3001 (9)]. Of, or relating to, a tribe, people, or culture indigenous to the Unites States, including Alaska and Hawaii [43 CFR 10.2(d)].

- **Native Hawaiian:** Any individual who is a descendant of the aboriginal people who, prior to 1778, occupied and exercised sovereignty in the area that now constitutes the state of Hawaii [36 CFR § 800.16(s)(2)].
- **Native Hawaiian Organization:** Any organization which serves and represents the interests of Native Hawaiians; has as a primary and stated purpose the provision of services to Native Hawaiians; and has demonstrated expertise in aspects of historic preservation that are significant to Native Hawaiians [36 CFR § 800.16(s)].
- **Policy statement:** A formal statement, endorsed by the full ACHP membership, representing the membership's collective thinking about what to consider in reaching decisions about select issues, in this case, human remains and funerary objects encountered in undertakings on federal, tribal, state, or private lands. Such statements do not have the binding force of law.
- **Preservation in place:** Taking active steps to ensure the preservation of a property.
- **Protection of Historic Properties**: Regulations [36 CFR Part 800] implementing Section 106 of the National Historic Preservation Act.
- **Section 106**: That part of the National Historic Preservation Act which establishes a federal responsibility to take into account the effects of undertakings on historic properties and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to such action.
- **State Historic Preservation Officer:** The official appointed or designated pursuant to Section 101(b)(1) of NHPA to administer the state historic preservation program.
- **Tribal Historic Preservation Officer**: The official appointed by the tribe's chief governing authority or designated by a tribal ordinance or preservation program who has assumed the responsibilities of the SHPO for purposes of Section 106 compliance on tribal lands in accordance with Section 101(d)(2) of NHPA.
- **Treatment:** Under Section 106, "treatments" are measures developed and implemented through Section 106 agreement documents to avoid, minimize, or mitigate adverse effects to historic properties.

Acronyms Used for the Policy Statement
- **ACHP**: Advisory Council on Historic Preservation.
- **ARPA**: Archaeological Resources Protection Act [16 U.S.C. 470aa-mm].
- **NHPA**: National Historic Preservation Act [16 U.S.C. § 470f].
- **NAGPRA**: The Native American Graves Protection and Repatriation Act [25 U.S.C. 3001 et seq].
- **SHPO**: State Historic Preservation Officer
- **THPO**: Tribal Historic Preservation Officer

[The members of the Advisory Council on Historic Preservation unanimously adopted this policy on February 23, 2007]

ATTACHMENT 29 – UNANTICIPATED DISCOVERIES PLAN FOR SUBMERGED ARCHAEOLOGICAL SITES, HISTORIC PROPERTIES, AND CULTURAL RESOURCES INCLUDING HUMAN REMAINS: REVOLUTION WIND FARM FOR LEASE AREA OCS A-0486 CONSTRUCTION AND OPERATIONS PLAN

[Insert ATTACHMENT 29 – REVOLUTION WIND MARINE UNANTICIPATED DISCOVERY PLAN]

DRAFT

Unanticipated Discoveries Plan for Submerged Archaeological sites, Historic Properties, and Cultural Resources including Human Remains, Revolution Wind Farm for Lease Area OCS A-0486 Construction and Operations Plan

Prepared for

Revolution Wind LLC
56 Exchange Terrace
Suite 300
Providence, RI 02903

and

VHB Engineering
99 High St # 10
Boston, MA 02110

Authored by

Benjamin C. Wells, MA, RPA, Joseph Grinnan, MA, RPA, and Jeffrey M. Enright, MA, RPA

SEARCH

www.searchinc.com

July 2022

INTRODUCTION

Revolution Wind LLC (Revolution Wind) proposes to construct and operate the Revolution Wind Farm Project (Project) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS A-0486 (Lease Area). The Project consists of the Revolution Wind Farm (RWF) and the Revolution Wind Farm Export Cable (RWEC) route, which traverses federal and state waters. The RWEC has a proposed landfall near Quonset Point in North Kingstown, Rhode Island. Revolution Wind has submitted a Construction and Operations Plan (COP) for the Project to BOEM to support the development, operation, and eventual decommissioning of Project infrastructure, including offshore wind turbines, offshore substations, array cables, substation interconnector cables, and offshore export cables. SEARCH provided technical expertise to Revolution Wind's environmental consultant, VHB Engineering (VHB), by providing a Qualified Marine Archaeologist (QMA) in accordance with Lease Agreement Stipulation Addendum C Section 2.1.1.2.

SEARCH developed this Unanticipated Discoveries Plan (UDP) to assist Revolution Wind and its contractors to preserve and protect potential cultural resources from adverse impacts caused by Project construction, operation and maintenance, and decommissioning activities. The UDP sets forth guidelines and procedures to be used in the event potential submerged cultural resource are encountered during bottom disturbing activities and assists Revolution Wind in its compliance with Section 106 of the National Historic Preservation Act (NHPA) (Title 54 U.S.C. § 306108), Native American Graves Protection and Repatriation Act (Title 25 U.S.C. § 3001 et seg.), Lease OCS A-0486 Lease Stipulations, and other relevant state and local laws as applicable. This UDP is subject to revisions based on consultations with interested parties pursuant to Section 106 of the National Historic Preservation Act or the Act's implementing regulations at 36 CFR Part 800.

ROLES AND RESPONSIBILITIES

Implementation of the provisions and procedures in the UDP will require the coordinated efforts of Revolution Wind and their contractors during all construction, operations and maintenance, and decommissioning activities with the potential to impact the seafloor. The following sections identify key participants in the UDP and outlines their roles and responsibilities.

REVOLUTION WIND

Implementation of the provisions and procedures outlined in this plan is ultimately the responsibility of Revolution Wind or its designee, who will be responsible for the following:

- Ensuring procedures and policies outlined in the UDP and UDP training materials are implemented;
- Identifying a responsible party within Revolution Wind tasked with overseeing implementation of the UDP during all project and contractor activities;
- Developing cultural resource and UDP awareness training programs for all project staff and contractors;
- Requiring all project and contractor staff complete cultural resource and UDP awareness training;
- Coordinating and facilitating communication between the QMA, project staff, and contractors if a potential cultural resource is encountered during project activities; and
- Participating in and/or facilitating consultations with state and federal agencies (BOEM, Naval History and Heritage Command [NHHC], Rhode Island Historical Preservation & Heritage Commission [RIHPHC], etc…), federally recognized Tribes'/Tribal Nations' Tribal Historic Preservation Offices (THPOs), and other consulting parties, as appropriate.

QUALIFIED MARINE ARCHAEOLOGIST

Revolution Wind will retain the services of a QMA to provide cultural resource advisory services during implementation of the UDP. The QMA will be responsible for the following:

- Assist Revolution Wind with the development and implementation of the procedures outlined in the UDP;
- Assist Revolution Wind in developing a cultural resource and UDP awareness training program and informational graphic;
- Review and document potential submerged cultural resources identified by the project and/or contractor staff;

- Assist Revolution Wind with the Section 106 consultation process that may arise as a result of an unanticipated submerged cultural resource; and
- Conduct archaeological investigation of unanticipated submerged cultural resources following coordination with appropriate consulting parties.

TRAINING AND ORIENTATION

As described in the previous section, Revolution Wind will be responsible for ensuring Project and contractor staff complete a cultural resources and UDP awareness training program prior to the start of bottom disturbing activities. The training will be sufficient to allow Project and contractor staff to identify common types of marine cultural resources and implement the UDP procedures. The training will be delivered as a standalone training and/or combined with the Project's or contractors' general health and safety (H&S) or environment, health, and safety (EHS) induction training.

The training program will include, but not be limited to, the following elements:

- A review of applicable state and federal cultural resource laws and regulations;
- Characteristics of common types of submerged cultural resources found on the Atlantic Outer Continental Shelf (e.g. wooden shipwrecks, metal shipwrecks, downed aircraft, post-Contact artifacts, pre-Contact artifacts, bone and faunal remains, etc.);
- How to identify potential submerged cultural resources during bottom disturbing activities; and
- Procedures to follow and parties to notify if potential submerged cultural resources/materials are encountered during project activities.

The SEARCH QMA will develop draft cultural resources and UDP awareness training in coordination with Revolution Wind. The training program will be provided to BOEM and the RIHPhC for review and comment before the training program is finalized.

In additional to the training program, the SEARCH QMA will generate an informational graphic summarizing the UDP and the materials discussed in the cultural resources and UDP awareness training program. The informational graphic will include:

- Images of common types of submerged cultural resources and materials;
- A flow chart depicting the UDP reporting process;
- A notice to all employees of their stop work authority if potential cultural resources are encountered; and
- Contact information for the Revolution Wind staff responsible for overseeing implementation of the UDP and the QMA.

The informational graphic will be placed in a conspicuous location on each project and contractor vessel where workers can see it and copies will be made available to project and/or contractor staff upon request.

PROCEDURES WHEN CULTURAL MATERIAL ARE OBSERVED

As part of its COP submission, Revolution Wind conducted an extensive marine archaeological resources assessment (MARA) of the Project's preliminary area of potential effects (PAPE). The MARA identified 19 potential submerged cultural resources (Targets 01-19) and 8 geomorphic features of archaeological interest (Targets 20-28) within the PAPE. Revolution Wind anticipates avoidance of Targets 01-19 and their associated recommended avoidance buffers. Additionally, as the final design is not known, the degree of adverse effects to Targets 20-28 is currently unknown. Revolution Wind is developing a Mitigation Framework to aid in avoiding, minimizing, and/or mitigating adverse effects upon historic properties.

Even with the extensive preconstruction marine archaeological surveys, it is impossible to ensure that all cultural resources have been identified within the PAPE. Even at sites that have been previously identified and assessed, there is a potential for the discovery of previously unidentified archaeological components, features, or human remains that may require investigation and assessment. Furthermore, identified historic properties may sustain effects that were not originally anticipated. Therefore, a procedure has been developed for the treatment of unanticipated discoveries that may occur during site development.

The procedure also will be implemented should an unanticipated archaeological find occur during investigations to ground-truth potential unexploded ordnance (pUXO). In addition, Revolution Wind will involve the QMA during pUXO investigations to consult and monitor. Revolution Wind has agreed to a protocol for inspections that includes a decision tree for contacting the QMA; providing the QMA with inspection reports, including video footage, still photographs, multibeam echosounder imagery, and pUXO specialist observations; and real-time video monitoring for inspections that occur atop shallowly buried geomorphic features of archaeological interest.

The implementation of the final UDP will be overseen by Revolution Wind and a QMA who meets or exceeds the Secretary of the Interior's *Professional Qualifications Standards for Archaeology* [48 FR 44738-44739] and has experience in conducting HRG surveys and processing and interpreting data for archaeological potential [BOEM 2020]. See **Figure 1** for a flow chart of the communications and notification plan for unanticipated discoveries.

If unanticipated submerged cultural resources are discovered, the following steps should be taken:

(1) Per Lease Stipulation 4.2.7.1, all bottom-disturbing activities in the immediate area of the discovery shall cease and every effort will be made to avoid or minimize impacts to the potential submerged cultural resource(s).
(2) The project or contractor staff will immediately notify Revolution Wind of the discovery.
(3) Revolution Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the find site or the vessel that recovered the cultural material to inspect

the find. If the find is a cultural resource, the QMA will provide a preliminary assessment as to its potential to be a historic property as defined in 36 CFR Part 800.

(4) Per Lease Stipulation 4.2.7.1, BOEM shall be notified of the potential submerged cultural resource within 24 hours of the discovery. Revolution Wind shall also notify the State Historic Preservation Officer (SHPO) of Rhode Island and/or Massachusetts, the State Archaeologist(s), and the Tribal Historic Preservation Officers (THPOs) or other designated representatives of the consulting tribal governments. If the potential submerged cultural resource could be a sunken military craft under the jurisdiction of the Department of the Navy, then Revolution Wind additionally will notify the NHHC.

(5) Within 72 hours of being notified of the discovery, Revolution Wind shall issue a report in writing to BOEM providing available information concerning the nature and condition of the potential submerged cultural resource and observed attributes relevant to the resource's potential eligibility for listing in the National Register of Historic Places (NRHP).

(6) Revolution Wind shall consult with BOEM, as feasible, to obtain technical advice and guidance for the evaluation of the discovered cultural resource.

(7) If the impacted resource is determined by BOEM, in consultation with the NHHC if applicable to a sunken military craft, to be NRHP eligible, a mitigation plan shall be prepared by Revolution Wind for the discovered cultural resource. This plan must be reviewed by BOEM prior to submission to the RI/MA SHPO and representatives from consulting federally recognized Tribes/Tribal Nations for their review and comment, as well as provided to the NHHC for review and approval if the potential cultural resource falls under the jurisdiction of the Department of the Navy. The RI/MA SHPO and Tribes/Tribal Nations will review the plan and provide comments and recommendations within one week, with final comments to follow as quickly as possible.

(8) Per Lease Stipulation 4.2.6, Revolution Wind may not impact a known archaeological resource in federal waters without prior approval from BOEM. If the potential resource falls under the jurisdiction of the Department of the Navy, then similar approval will be provided from the NHHC. No development activities in the vicinity of the cultural resource will resume until either a mitigation plan is executed or, if BOEM, or the NHHC if applicable, determines a mitigation plan is not warranted, BOEM provides written approval to Revolution Wind to resume bottom disturbing activities. For discoveries in state waters, Revolution Wind will not impact a known archaeological resource with prior approval from BOEM and the RI/MA SHPO.

If suspected human remains are encountered, the below procedures, which comply with the Advisory Council on Historic Preservation's (ACHP) *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*, should be followed.

(1) All work in the near vicinity of the human remains shall cease and reasonable efforts should be made to avoid and protect the remains from additional impact. Encountered potential material shall be protected, which may include keeping the remains submerged in an onboard tank of sea water or other appropriate material.

(2) The Onboard Representative shall immediately notify the County Medical Examiner, State Archaeologist, the Forensic Anthropology Unit of the Rhode Island State Police, and Revolution Wind as to the findings.

(3) Revolution Wind will notify the QMA and provide them with sufficient information/documentation on the potential find to allow the QMA to evaluate the discovery and determine if the find is a cultural resource. If necessary, the QMA may request to visit the vessel to inspect the potential human remains. If the find is a cultural resource, the QMA will provide a preliminary assessment. The QMA will document and inventory the remains and any associated artifacts, and assist in coordinating with federal, state, and local officials.

(4) A plan for the avoidance of any further impact to the human remains and/or mitigative excavation, reinternment, or a combination of these treatments will be developed in consultation with the State Archaeologist; the RI/MA SHPO; BOEM; the NHHC, if the potential human remains could be associated with a sunken military craft under the jurisdiction of the Department of the Navy; and appropriate Tribes or closest lineal descendants. All parties will be expected to respond with advice and guidance in an efficient time frame. Once the plan is agreed to by all parties, the plan will be implemented.

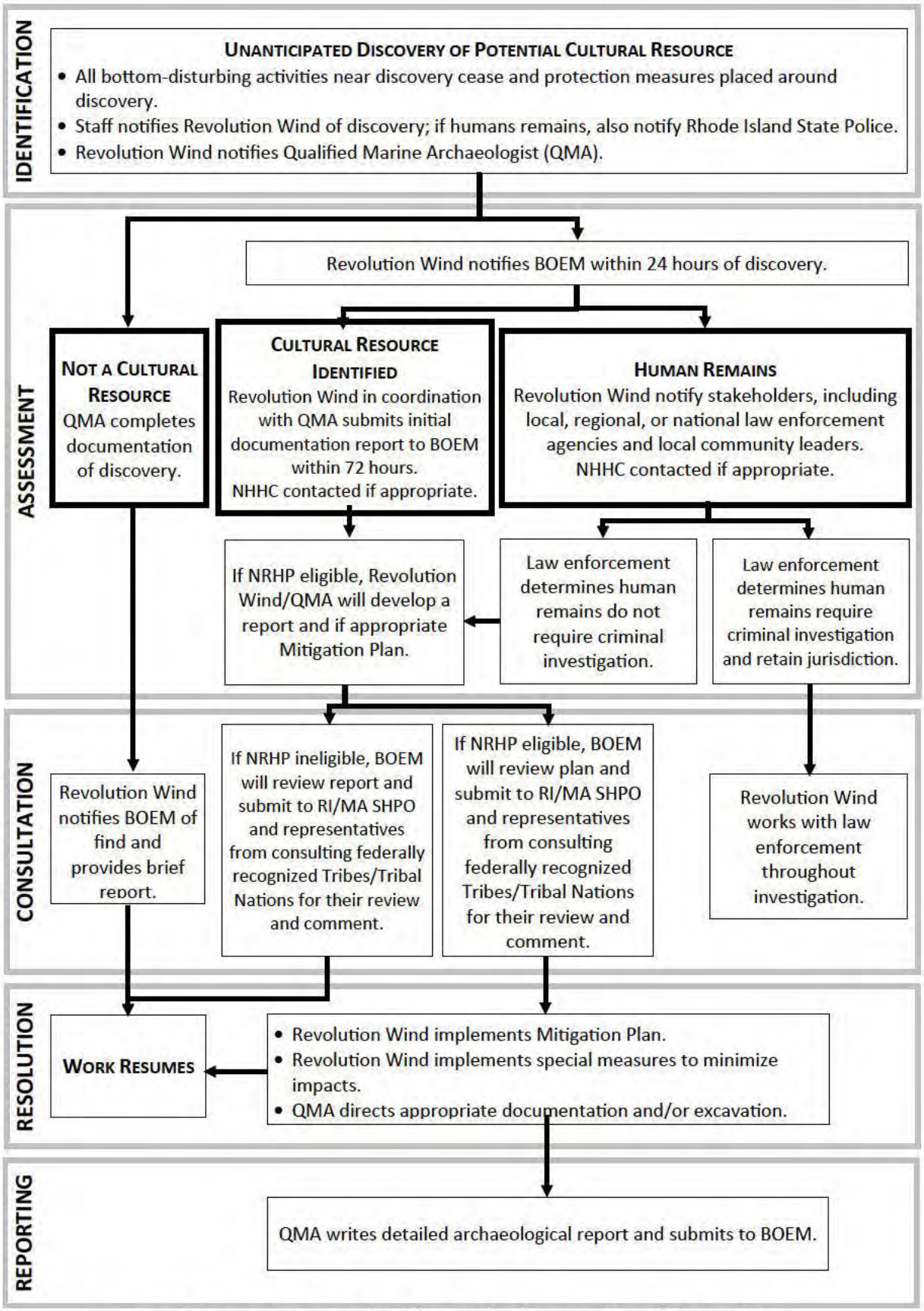

Figure 1. Communications and notification plan for unanticipated discoveries.

ARCHAEOLOGICAL INVESTIGATION OF A SUBMERGED UNANTICIPATED DISCOVERY

Archaeological investigation of a submerged unanticipated discovery may be necessary in order to evaluate the find, determine its eligibility for listing in the NRHP, and/or assess any construction impacts that may have occurred. The following is a recommended procedure for complying with the UDP and providing BOEM; NHHC, if applicable; and RI/MA SHPO with the necessary information to make informed decisions to approve continuation of bottom disturbing activities. After each step, consultation among the appropriate parties will occur.

(1) Initial assessment of unanticipated discovery via a refined HRG survey and/or ROV investigation (Phase Ia reconnaissance survey).
    a. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.
(2) Develop an avoidance zone based upon Step 1.
    a. Minimally, construction activity will remain outside of the avoidance zone for a period of time necessary to allow archaeological investigation, if required.
    b. Determine whether construction activity can remain outside of the avoidance zone permanently.
(3) Identify the source, delineate the site boundary, and assess potential impacts that led to the unanticipated discovery (Phase Ib identification).
    a. Accomplished utilizing archaeological/scientific diving and/or ROV investigation.
    b. May result in no further recommended action (i.e., target is not a historic property) or additional investigation.
(4) Determine eligibility for listing in the NRHP (Phase II NRHP evaluation).
    a. Accomplished utilizing archaeological/scientific diving.
    b. May require extensive excavation.
    c. May require archival research.
(5) Develop a strategy to resolve adverse effects to the historic property that occurred as a result of the unanticipated discovery and to minimize or mitigate potential future adverse effects as construction proceeds.
(6) On-site monitoring of bottom disturbing activities at the location.

Not all of these steps may be necessary, and the appropriate course of action will be determined at the time of discovery and in consultation with BOEM and if applicable, RI/MA SHPO.

NOTIFICATION LIST

Bureau of Ocean Energy
Sarah Stokely
Lead Historian and Section 106 Team Lead
Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road, VAM-OREP
Sterling, Virginia 20166
Sarah.Stokely@boem.gov

Revolution Wind Responsible Party
TBD

Naval History and Heritage Command
Alexis Catsambis, PhD
Underwater Archaeology Branch
805 Kidder Breese St, SE
Washington, DC 20374
Phone: (202) 685-1073

Rhode Island Historic Preservation and Heritage Commission
Mr. Jeffrey Emidy
Interim Executive Director
Deputy State Historic Preservation Officer
Old State House
150 Benefit St.
Providence, RI 02903
Phone: (401) 222-2678

Massachusetts Historical Commission
Ms. Brona Simon
State Historic Preservation Officer and Executive Director
220 Morrissey Blvd.
Boston, MA 02125-3314
Phone: (617) 7278470

Massachusetts Board of Underwater Archaeological Resources
Mr. David Robinson
Director
251 Causeway St.
Ste. 800
Boston, MA 02114-2136
Phone: (617) 626-1014

Rhode Island State Police
Center for Forensic Sciences
State Health Laboratory
50 Orms St.
Providence, RI 02904-2222
Phone: (401) 222-5600

Washington County Medical Examiner & Coroner Office
County Medical Examiner
48 Orms St.
Providence, RI 02904
Phone: (401) 222-5500

Mashpee Wampanoag Tribe
David Weeden
Tribal Historic Preservation Officer
483 Great Neck Road, South
Mashpee, MA 02649
Phone: (774) 327-0068
David.Weeden@mwtribe-nsn.gov

Wampanoag Tribe of Gay Head (Aquinnah)
Bettina Washington
Tribal Historic Preservation Officer
20 Black Brook Road
Aquinnah, MA 02535-1546
Phone: (508) 560-9014
thpo@wampanoagtribe-nsn.gov

Mashantucket Pequot Tribal Nation

Michael Kicking Bear Johnson
Deputy Tribal Historic Preservation Officer
110 Pequot Trail
Mashantucket, CT 06338
860-501-7988
mejohnson@mptn-nsn.gov

The Narragansett Indian Tribe

Mr. John Brown, III
Tribal Historic Preservation Officer
P.O. Box 268
Charlestown, RI 02813
Phone: (401).364-1100
tashtesook@aol.com

Mohegan Tribe of Indians in Connecticut

James Quinn
Tribal Historic Preservation Officer
1 Church Lane (Parking address) (35.68 mi)
Uncasville, CT, CT 06382
860-862-6893

The Shinnecock Indian Nation

Mr. Bryan Polite
Chair of Tribal Trustees
PO Box 5006
Southampton, NY 11969
Phone: (631) 283-6143
bryanpolite@shinnecock.org

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Advisory Council on Historic Preservation's (ACHP)

2007 *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects*.https://www.achp.gov/sites/default/files/policies/2018-06/ACHPPolicyStatementRegardingTreatmentofBurialSitesHumanRemainsandFunerary Objects0207.pdf, Digital article accessed December 9, 2021.

Bureau of Ocean Energy Management (BOEM)

2020 *Guidelines for Providing Archaeological and Historical Property Information Pursuant to 30 CFR Part 585.* United States Department of the Interior, Office of Renewable Energy Programs.

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Introduction

The Bureau of Ocean Energy Management (BOEM) considered alternatives to the Proposed Action that were identified through coordination with cooperating and participating agencies and through public comments received during the public scoping period for the environmental impact statement (EIS). BOEM evaluated the alternatives and excluded from further consideration alternatives that did not meet the purpose and need, did not meet the screening criteria, or both. The screening criteria are presented below. Alternatives that were considered and carried forward for detailed analysis are presented in Section 2.1, Alternatives, of the EIS, and alternatives excluded from further consideration are presented in Section 2.1.7, Alternatives Considered but Dismissed from Detailed Analysis.

The sections below provide more detail on BOEM's screening criteria followed by additional background on the evolution of the layouts carried forward for Alternatives C1, C2, E1, and E2.

Alternatives Screening Criteria

BOEM applied rule of reason in identifying reasonable alternatives that are both technically and economically feasible and meet the purpose and need of the Proposed Action. An alternative was considered but not analyzed in detail if it met any of the following criteria:

- It is outside the jurisdiction of the lead agency,[1] including resulting in activities that are not allowed under the lease (e.g., requiring locating part or all of the wind energy facility outside of the Lease Area or constructing and operating a facility for another form of energy).
- It would not respond to the purpose and need of BOEM's action, including not furthering the United States' policy to make Outer Continental Shelf energy resources available for expeditious and orderly development, subject to environmental safeguards (43 USC 1332(3).
- It would require a major change to an existing law, regulation, or policy.
- It would not be responsive to the applicant's goals, lease constraints, and obligations, such as alternatives that would
    - partially or completely relocate the Project outside of the defined geographic area where it was proposed; or
    - result in the development of the Project that would not allow the developer to satisfy contractual obligations (e.g., resulting in the Project having a nameplate capacity that is less than what is required under a power purchase agreement (PPA); or
    - result in significant implementation delays that would prevent the Project from initiating commercial operations by the contractually required date in the PPA).[2]

[1] "Include reasonable alternatives not within the jurisdiction of the lead agency" was removed with the Council on Environmental Quality's updated NEPA-implementing regulations. See 43304 *Federal Register* 85, July 16, 2020.

[2] Where present, meeting an offtake agreement(s) is the primary goal of the applicant's proposal. Offtake agreements (in the case of Revolution Wind, the three PPA agreements) are also unlike other private agreements between two for-profit entities involved in an offshore wind project. 1) The offtake agreement is the primary (and often sole) source of revenue for a project. Offshore wind projects will not obtain financing for the capital investment needed for construction without an offtake agreement. This

- It is technically infeasible, meaning implementation of the alternative is unlikely given past and current practice, technology (e.g., experimental turbine design or foundation type), or site conditions (e.g., presence of boulders), as determined by BOEM's technical experts.
- It is economically infeasible, meaning implementation of the alternative is unlikely due to unreasonable costs as determined by BOEM's technical experts; although this does not require cost-benefit analysis or speculation about an applicant's costs and profits, there must be a reasonable basis.
- It cannot be analyzed because its implementation is remote or speculative, or it is too conceptual in that it lacks sufficient detail to meaningfully analyze impacts.
- It is substantially similar in design to an alternative that is or will be analyzed in detail.
- It is environmentally infeasible, meaning implementation of the alternative would not be allowed by another agency from which a permit or approval is required, or implementation results in an obvious and substantial increase in impacts on the human environment.

Alternative C: Habitat Impact Minimization Alternative (Habitat Alternative)

The Revolution Wind Renewable Energy Lease OCS-A 0486 (Lease Area), partially located on Cox Ledge, is dominated by complex benthic habitats, with large contiguous areas of complex habitats located centrally and throughout the entire southern portion of the Lease Area. Smaller, patchy areas of complex habitats also occur throughout the northern portion of the Lease Area (see Appendix X2 [Inspire Environmental 2021] in the *Construction and Operations Plan Revolution Wind Farm* [COP] [vhb 2022] for the benthic habitat mapping report).

BOEM received scoping comments from the U.S. Environmental Protection Agency (EPA), the New England and Mid-Atlantic Fisheries Management Councils, the Defenders of Wildlife, the Nature Conservancy, and the National Marine Fisheries Service (NMFS) that supported the creation of an EIS alternative focused on reducing impacts to complex benthic habitat that may support important commercial and recreational fisheries species in the Lease Area (SWCA Environmental Consultants n.d. [2021]). Some of these comments specifically cited the importance of Cox Ledge and surrounding complex habitat areas for Atlantic cod (*Gadus morhua*) spawning and survival of juvenile cod. The extensive boulders and cobbles in the area also provide habitat for other structure-oriented fish species, such as black sea bass (*Centropristis striata*).

makes the offtake agreement central to the economic feasibility of a project. 2) Offtake agreements are often the result of years of work by states and/or regional/local utilities that may include competitive award processes; are often the result of coordination with a regional independent system operator regarding point of interconnection and the capacity constraints therein; and are subject to considerable regulations regarding electricity pricing, interconnection requirements, and public interest considerations. BOEM finds that the unique position of these agreements necessitates more deference than a typical contract between two private for-profit entities. An alternative that fails to meet the main goal of the applicant would be equivalent to analyzing a no action alternative. Therefore, BOEM considers it appropriate under NEPA to analyze in detail only those alternatives that would allow lessees to meet the obligations under their offtake agreements.

Micrositing,[3] in which the installation location of a WTG foundation is altered slightly from the proposed location to avoid sensitive habitat or seabed hazards, allows for the reduction of impacts to complex habitats at some WTG locations. However, given the density of complex habitats throughout the Lease Area, it would not be feasible to fully avoid impacts to these habitats and meet the existing PPAs with the largest turbine size considered in the project design envelope (PDE). Therefore, Alternative C considers and prioritizes contiguous areas of complex habitat that should be excluded from development to avoid and minimize impacts to complex habitats to the greatest extent possible while meeting BOEM's purpose and need. Alternative C seeks to reduce impacts to sensitive benthic habitats within the Lease Area that are most vulnerable to permanent and long-term impacts from the Proposed Action. The number of WTGs that could be removed in Alternative C is based on the minimum power output for Revolution Wind (704 megawatts [MW]) using the largest capacity WTG in the PDE (12 MW). BOEM determined a maximum of 36 WTG locations could be eliminated from the proposed 100 locations, which includes a minimum of five "spare" WTG positions to allow for installation and engineering flexibility.

Preliminary Screening and Rationale

BOEM sought NMFS's Greater Atlantic Regional Fisheries Office's (GARFO) input on determining which WTG positions should be removed to most effectively reduce impacts to complex benthic habitats in the Lease Area. GARFO provided four priority areas for potential avoidance (Figure K-1). In order of descending priority, GARFO identified Area 1 (8 WTG positions), Area 2 (38 WTG positions), Area 3a (6 WTG positions), and Area 3b (9 WTG positions). These priority areas were based on multibeam backscatter data and the presence of identified large boulders (i.e., > 0.5–1.0 meters in diameter) within the Lease Area; their proximity to Cox Ledge; and the importance of these habitats as EFH, particularly for Atlantic cod. Based on the COP and additional feedback from the applicant, BOEM continues to assume no change to the offshore substation locations due to feasibility constraints that would delay the Project to the extent that it would no longer meet the PPA obligations or BOEM's purpose and need as described in Chapter 1.2 of the EIS. The scientific rationale for the prioritization of the four priority areas is provided in the following paragraphs.

[3] In accordance with 30 CFR 585.634(C)(6), micrositing of WTG foundations may occur within a 500-foot (152-meter) radius around each proposed WTG location. The micrositing allowance for the Project is a diamond shaped area within the 500-foot (152-meter) radius circle surrounding foundation locations, ensuring 1.15-mile (1-nautical mile) spacing on the cardinal directions and no less than 0.7 mile (0.6 nautical mile) on the inter-cardinal directions.

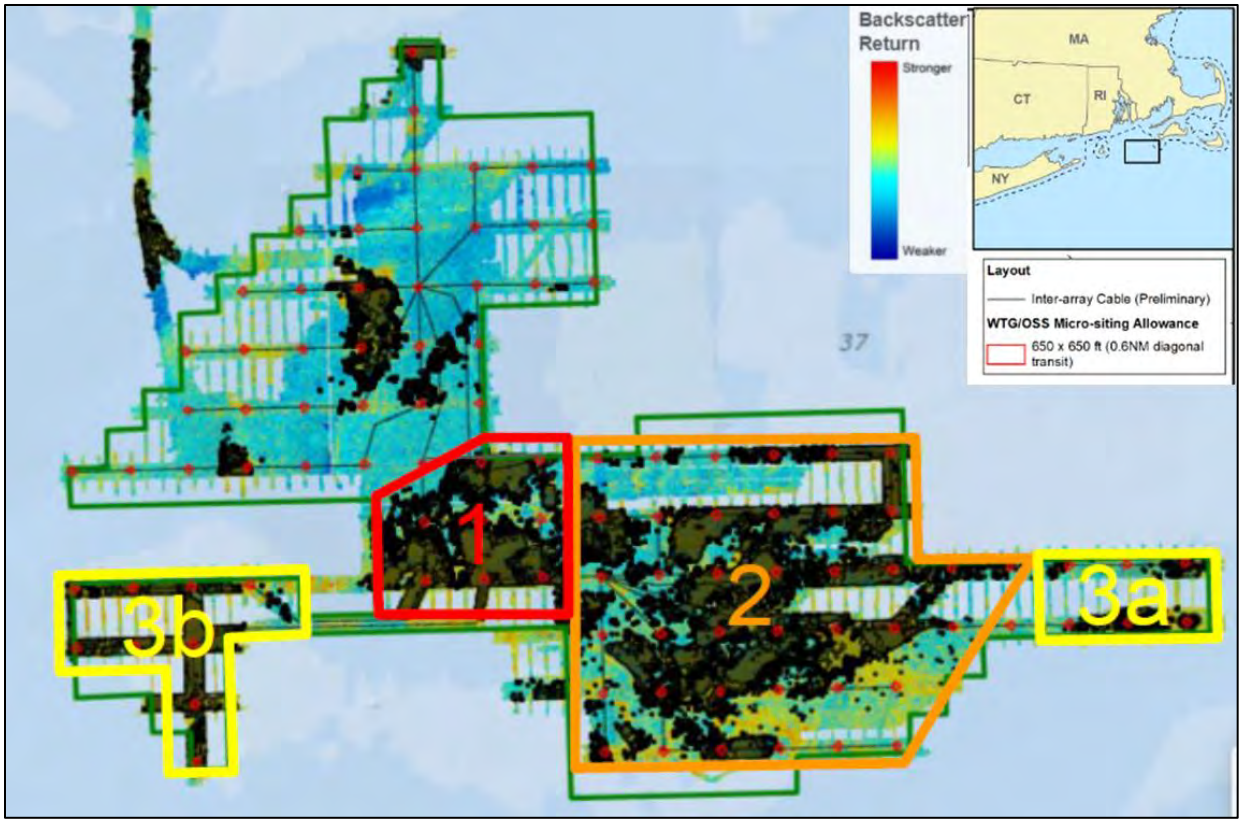

Figure K-1. Alternative C development. Revolution Wind Lease Area with multi-beam backscatter and boulder presence (dark green with black outlines; data from COP Appendix X2) shown in relation to the four priority areas identified for avoidance by GARFO on November 5, 2021.

Area 1 contains contiguous complex habitat illustrated by high multibeam backscatter return and a high density of large boulders (> 0.5–1.0 meters in diameter). This area overlaps with documented cod spawning activity based on recent acoustic, telemetry, and fisheries-dependent biological sample data (Van Hoeck et al. 2022; Van Parijs 2022). GARFO requested no modification in the shape of this area targeted for removal.

Area 2 contains large areas of contiguous complex habitat illustrated by high multibeam backscatter return and a high density of large boulders (> 0.5–1.0 meters in diameter). Acoustic and telemetry data for Atlantic cod in this area are extremely limited (Van Parijs 2022). Ongoing research and emerging data will assist in evaluating the importance of this area for cod spawning. GARFO requested that any modification of this area be limited to modifying the boundaries of the area rather than selection of particular turbine locations within the area and should prioritize maintaining the largest contiguous complex habitat area feasible.

Areas 3a and 3b are areas of complex habitat illustrated by high multibeam backscatter return and identified large boulders (> 0.5–1.0 meters in diameter) in which cod spawning has not been detected previously or is unknown. There is no available information or data to aid in evaluating the importance of these areas for cod spawning. GARFO requested that any development of these areas be considered only if it would allow for the protection and conservation of higher priority areas.

If BOEM omitted all the turbines within the identified priority areas (a total of 61 WTGs), from Alternative C, then Alternative C would not meet the purpose and need. A discussion of the further reduction of impacts to these habitats through the selection of Alternative C in conjunction with Alternative F is provided in EIS Section 3.13.2. BOEM developed the layouts for Alternative C based on the following criteria:

- GARFO's identified priority areas (Figure K-1)
- Maintaining continuity of complex habitat
- Boulder density (higher density areas were avoided over lower density areas)
- Multibeam backscatter data (high backscatter areas were avoided over lower backscatter areas) and,
- Engineering considerations such as maintaining linearity of inter-array cable layouts and maintaining offshore substation locations

BOEM identified two layouts for Alternative C that aim to address these criteria. Alternative C1 removes all WTG positions from Area 1 and 27 WTG positions from Area 2 leaving 65 WTG positions remaining (Figure K-2). Alternative C2 removes all WTG positions from Area 1 and 28 WTG positions from Area 2 leaving 64 WTG positions remaining (Figure K-3). Alternative C1 reduces development in areas of contiguous complex habitat slightly more than Alternative C2. Alternative C2 shifts exclusion of three WTG positions from the southeastern portion to areas further north to reduce development in or adjacent to known cod spawning areas, however, resulting in slightly less complex habitat avoided when compared to Alternative C1. See EIS Section 3.6.2.4 for more information on differences in impacts to complex habitats.

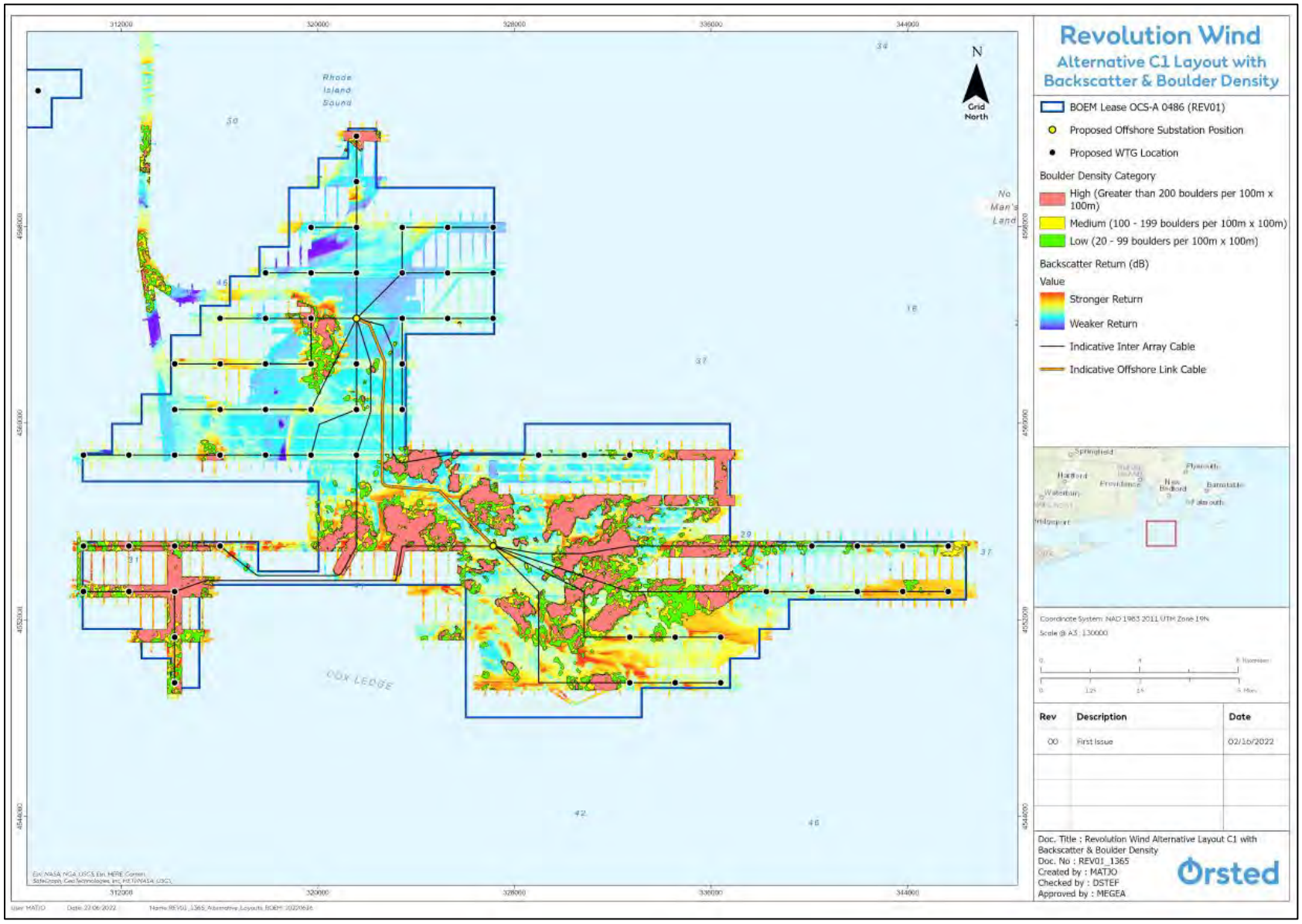

Figure K-2. Alternative C1 layout overlaid with backscatter and boulder density data. Image courtesy of Orsted.

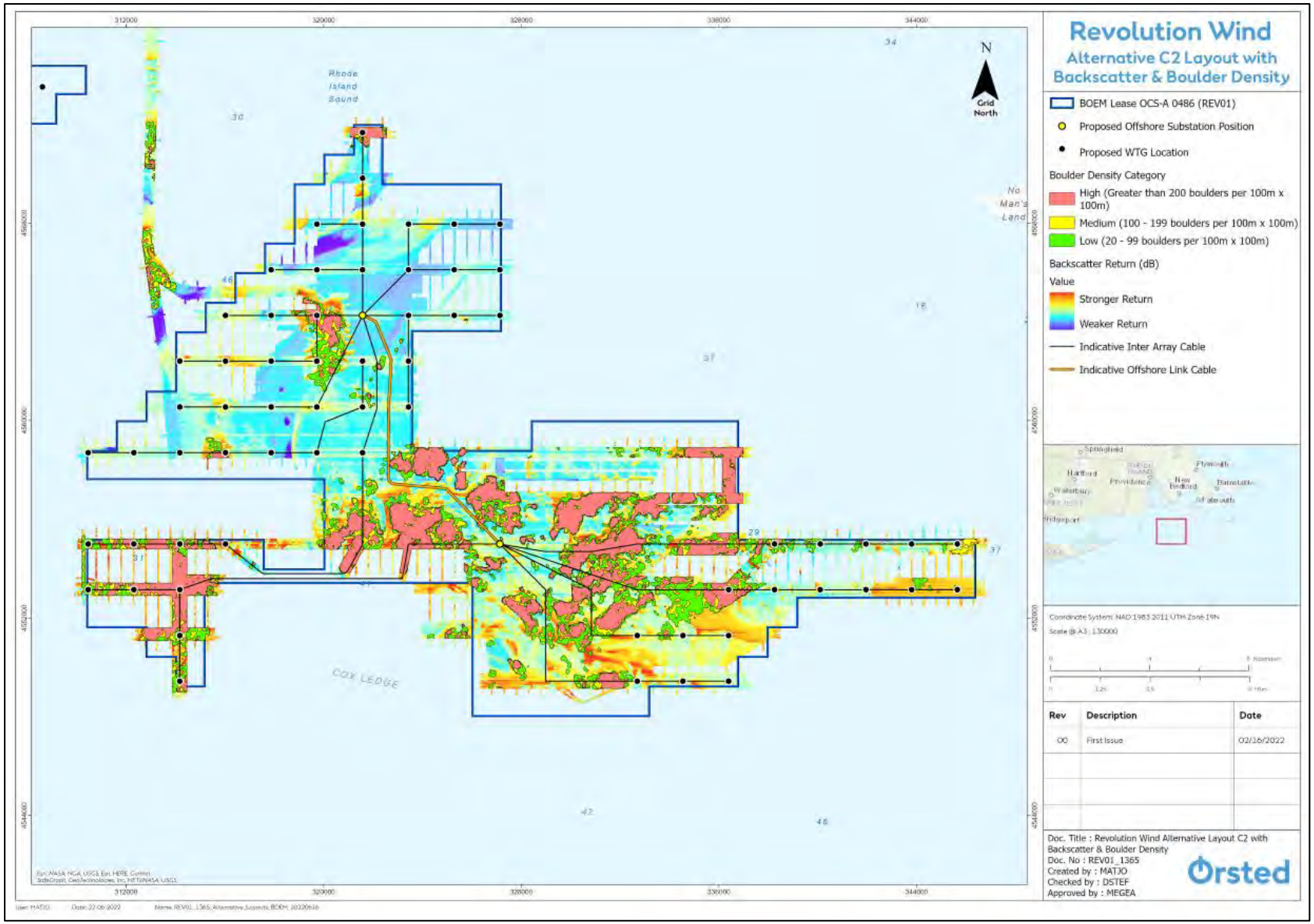

Figure K-3. Alternative C2 layout overlayed with backscatter and boulder density data. Image courtesy of Orsted.

Alternative E: Reduction of Surface Occupancy to Reduce Impacts to Culturally Significant Resources Alternative (Viewshed Alternative)

Background

The federally recognized Wampanoag Tribe of Gay Head (Aquinnah) have identified certain unencumbered views from the Gay Head Cliffs (i.e., Aquinnah Cliffs) on Martha's Vineyard as important to their oral history, traditions, cultural practices, and as a traditional cultural property (TCP) associated with the Wampanoag cultural hero Moshup. Through scoping and ongoing government-to-government consultation, the northernmost WTGs nearest to the Gay Head Cliffs were identified of the highest concern to the Wampanoag Tribe of Gay Head (Aquinnah), especially at sunset when these WTGs would be backlit and silhouetted. In a letter to BOEM on July 12, 2021, the tribe's historic preservation office noted the importance of the tribe's ancestral lands on the west side of Martha's Vineyard that include Gay Head Cliffs, designated as a national natural landmark by the National Park Service (Washington 2021). The letter also provided a map of the wind development area with an east to west line in which the Wampanoag Tribe of Gay Head (Aquinnah) opposes any development north thereof (Figure K-4). The tribe has expressed concerns that the introduction of offshore wind infrastructure will adversely affect the recently identified Vineyard Sound and Moshup's Bridge TCP and the Gay Head Cliffs National Natural Landmark (which is also part of the traditional cultural property). Factoring in the information and concerns of the Wampanoag Tribe of Gay Head (Aquinnah) and other stakeholders, along with balancing the purpose and need in EIS Section 1.2, BOEM considered a suite of options for removing WTG positions aimed at reducing impacts to viewsheds on and surrounding Martha's Vineyard.

Given the proximity of the Project to Martha's Vineyard, visibility of the offshore components cannot be completely eliminated under any action alternative or layout option, while maintaining the minimum positions needed to fulfill the PPA obligations (i.e. 704 MW). To determine which WTG positions could be removed to reduce visual impacts most effectively to these cultural resources, while still meeting the purpose and need, BOEM developed multiple layout options for Alternatives E1 and E2 and directed the Project applicant, Revolution Wind, to produce visual simulations of these layouts. BOEM shared these simulations with the Wampanoag Tribe of Gay Head (Aquinnah) and requested feedback on these potential layouts on September 10, 2021, and again on October 12, 2021, after an additional option was simulated.

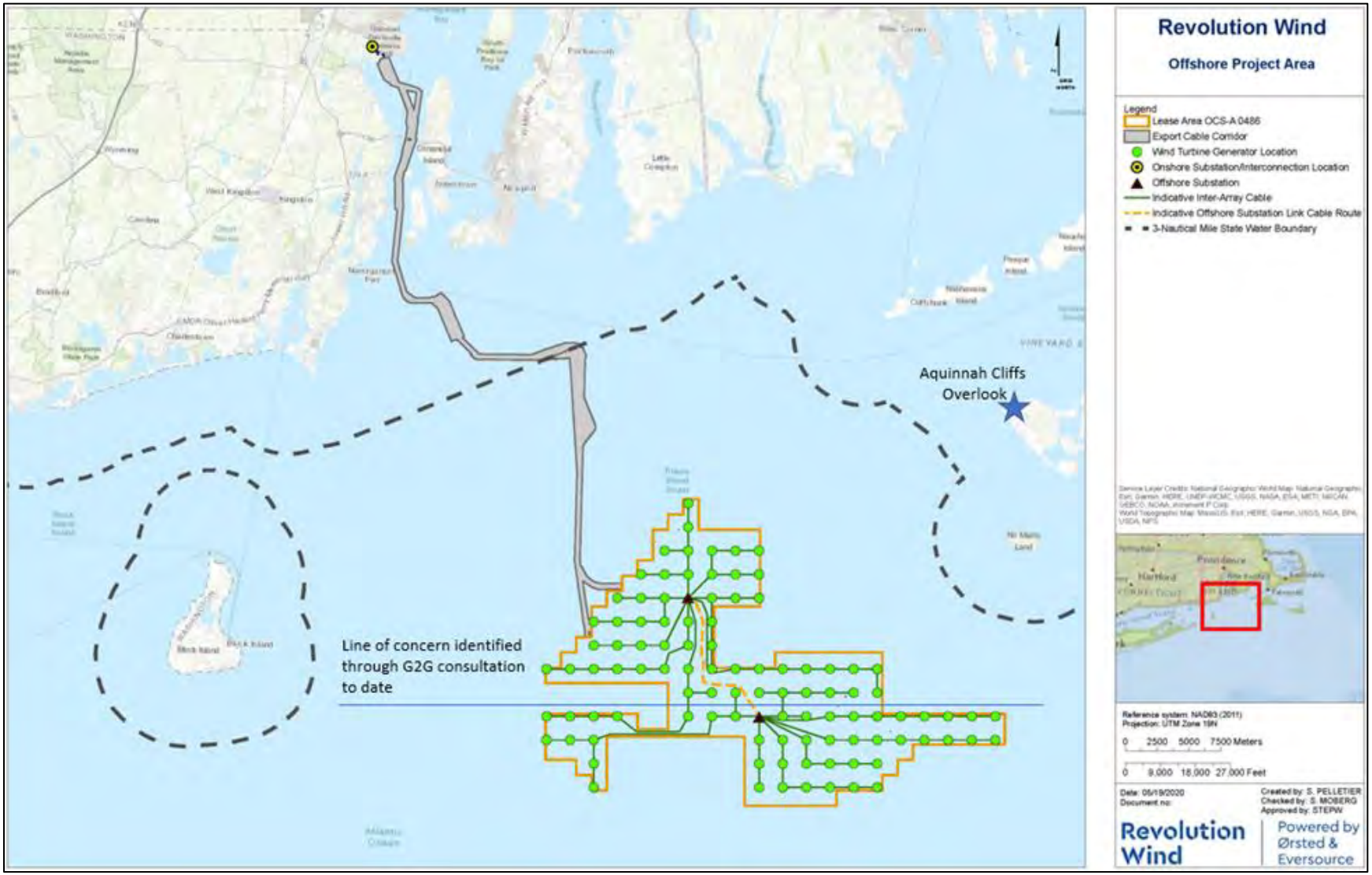

Figure K-4. The line of concern provided by the Wampanoag Tribe of Gay Head (Aquinnah) overlaid with the Lease Area as proposed in Revolution Wind's COP.

Preliminary Screening and Rationale

BOEM directed Revolution Wind to simulate eight potential WTG layouts for the Viewshed Alternative (four for E1 and four for E2). Figures K-5 through K-12 outline the layouts that were simulated and reviewed by BOEM's subject-matter experts and shared with the Wampanoag Tribe of Gay Head (Aquinnah) for input. No specific responses were received from the tribe; however, applying best professional judgement and input previously received by the tribe and other stakeholders, BOEM's subject-matter experts concluded that options E1-3 (Figure K-7) and E2-4 (Figure K-12) were most effective at reducing the visual impacts of concern at or near the Gay Head Cliffs, as well as other national historic landmarks and culturally important resources in Rhode Island and Massachusetts. Therefore, options E1-3 and E2-4 were carried forward for detailed analysis as Alternatives E1 and E2 in the EIS, acknowledging that neither alternative completely eliminates the visual impacts of concern for the reasons outlined above but offer a reasonable range of alternatives for consideration by stakeholders and the decisionmaker.

Layout option E1-3 (see Figure K-7) was carried forward because the WTGs on the northwest end appear further apart, reducing the visual clutter and "curtain effect" from the visual overlapping of WTG towers and blades. The horizontal field-of-view of the Project is also less in E1-3 than in all other layouts simulated except for E2-4, with enough positions remaining to fulfill the PPA agreements (i.e. 704 MW).

Layout option E2-4 (see Figure K-12) was carried forward because it reduces the number of WTGs that occupy the northwest end of the field-of-view within the sunset views from the Gay Head Cliffs overlook. Although this layout does not decrease visual prominence of WTGs further east in the Lease Area, it allows for a larger unobstructed sunset view within the northwestern portion of the Lease Area with enough positions remaining to fulfill the PPA agreements (i.e. 704 MW) up to the maximum potential output of the Project (880 MW). Figure K-13 provides a sunset simulation overlaid with the WTG positions that would be removed north-northwest of the northernmost offshore substation under layout option E2-4.

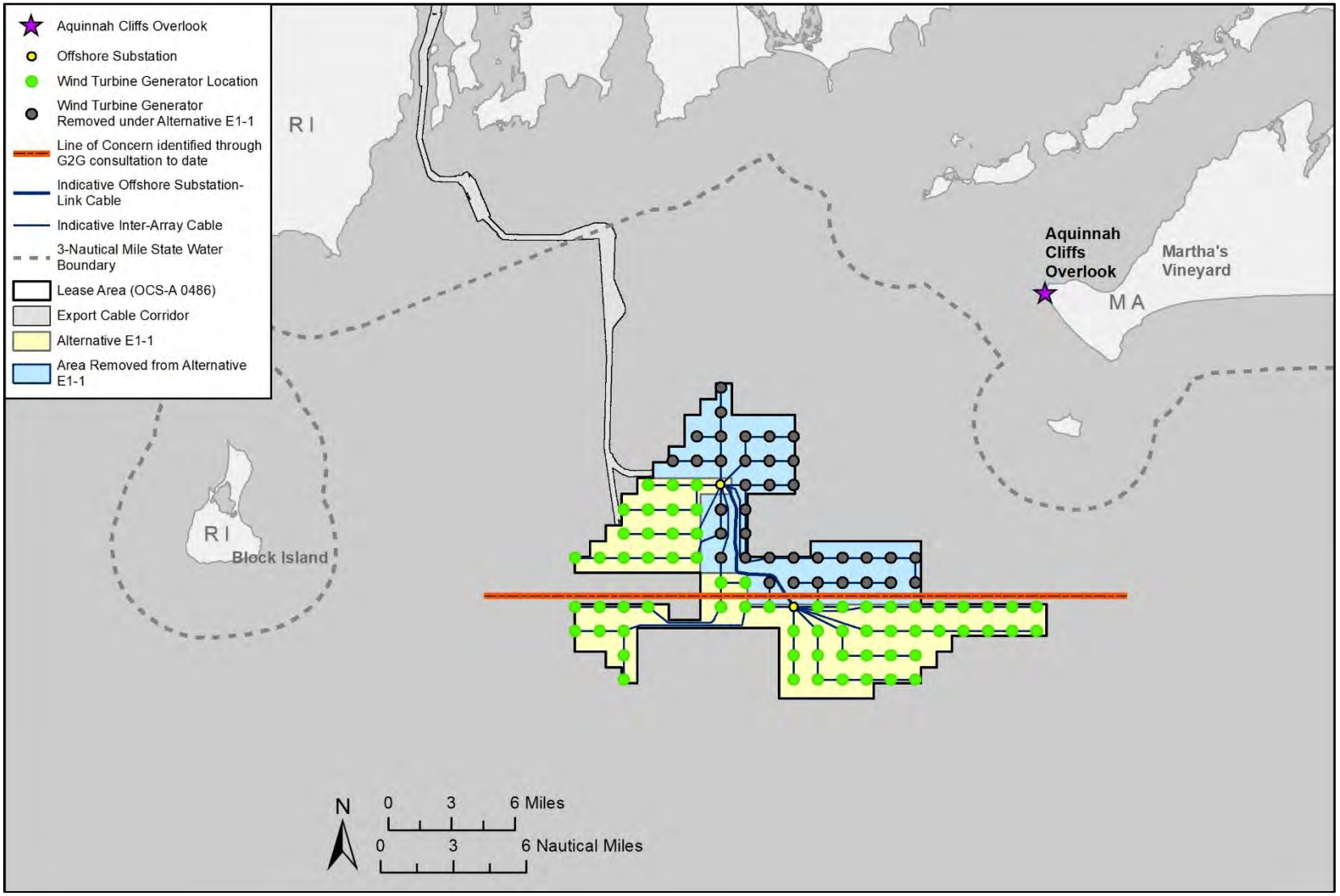

Figure K-5. Layout option 1 simulated for Alternative E1 (Alternative E1-1). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 704 MW maximum output; removal of 36 WTG positions (leaves 64 positions available).

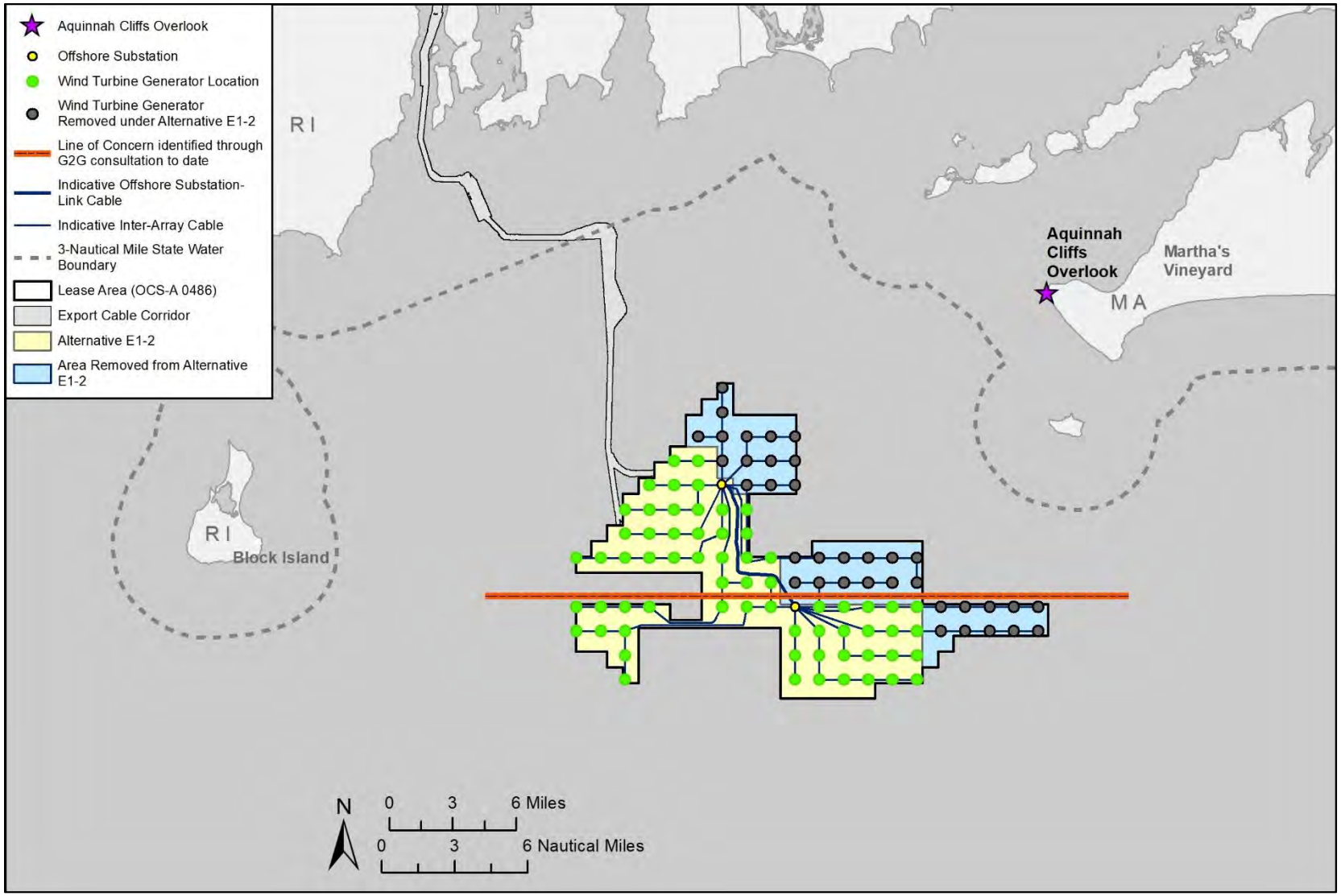

Figure K-6. Layout option 2 simulated for Alternative E1 (Alternative E1-2). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 704 MW maximum output; removal of 36 WTG positions (leaves 64 positions available).

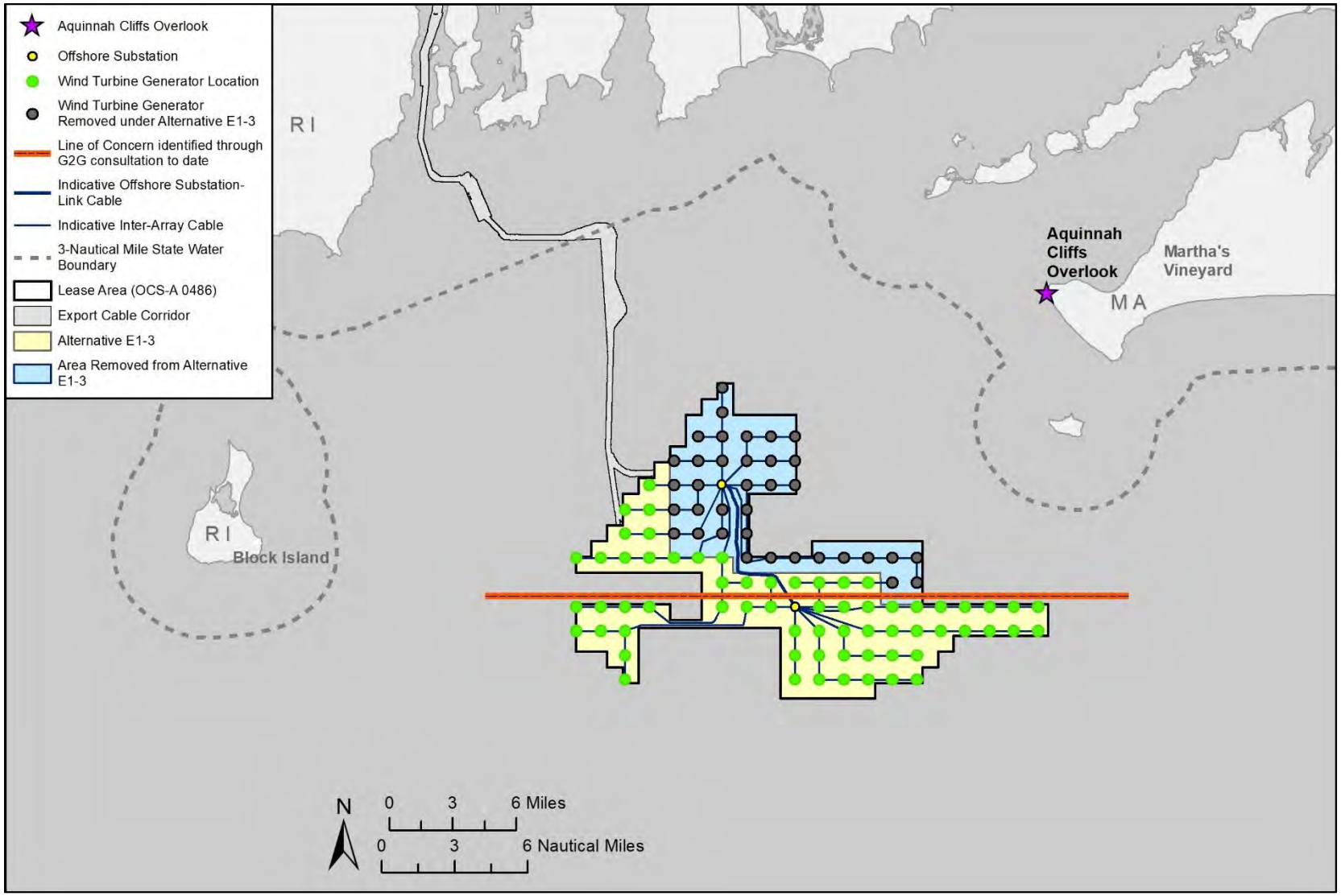

Figure K-7. Layout option 3 simulated for Alternative E1 (Alternative E1-3). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 704 MW maximum output; removal of 36 WTG positions (leaves 64 positions available).

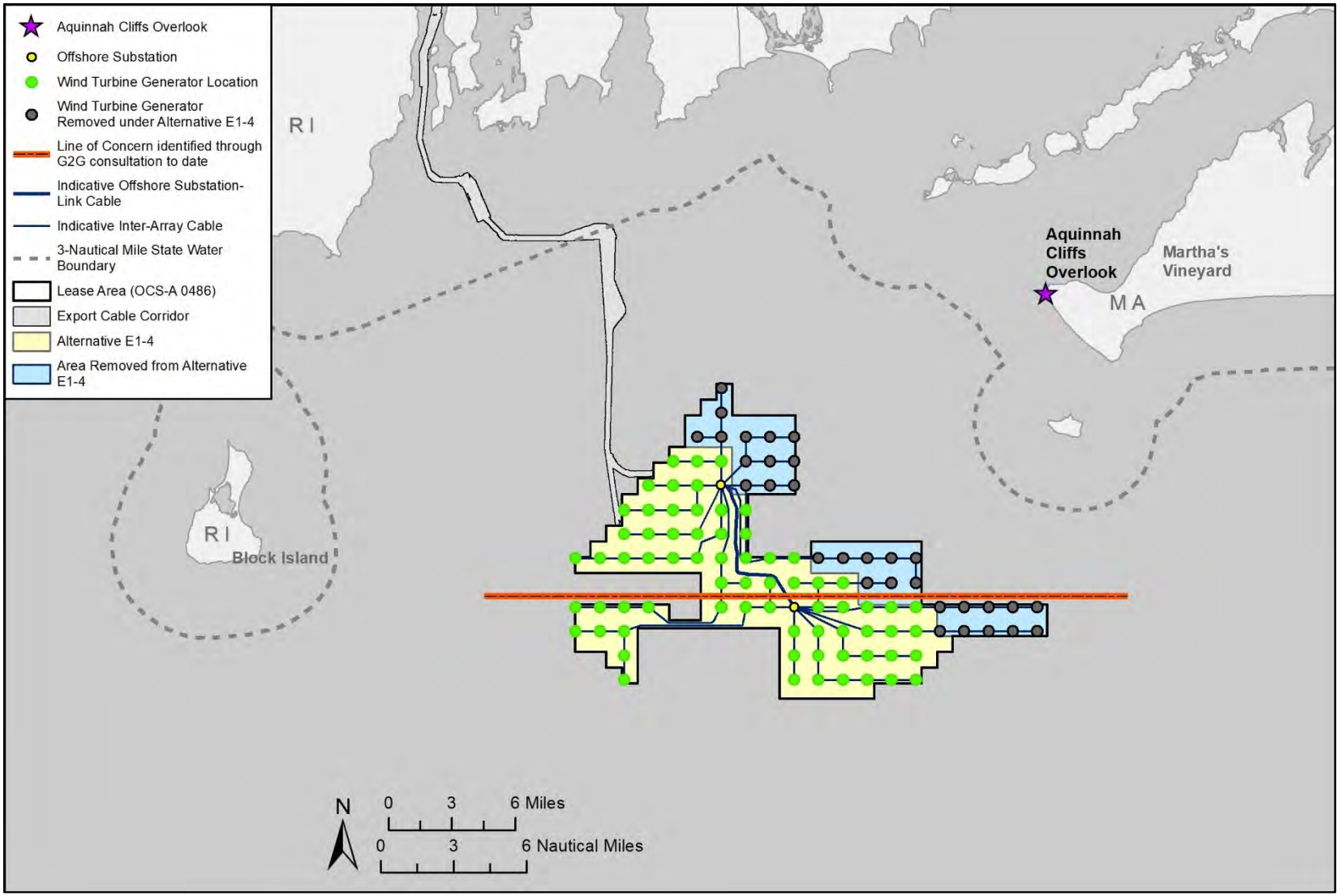

Figure K-8. Layout option 4 simulated for Alternative E1 (Alternative E1-4). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 828 MW maximum output; removal of 31 WTG positions (leaves 69 positions available).

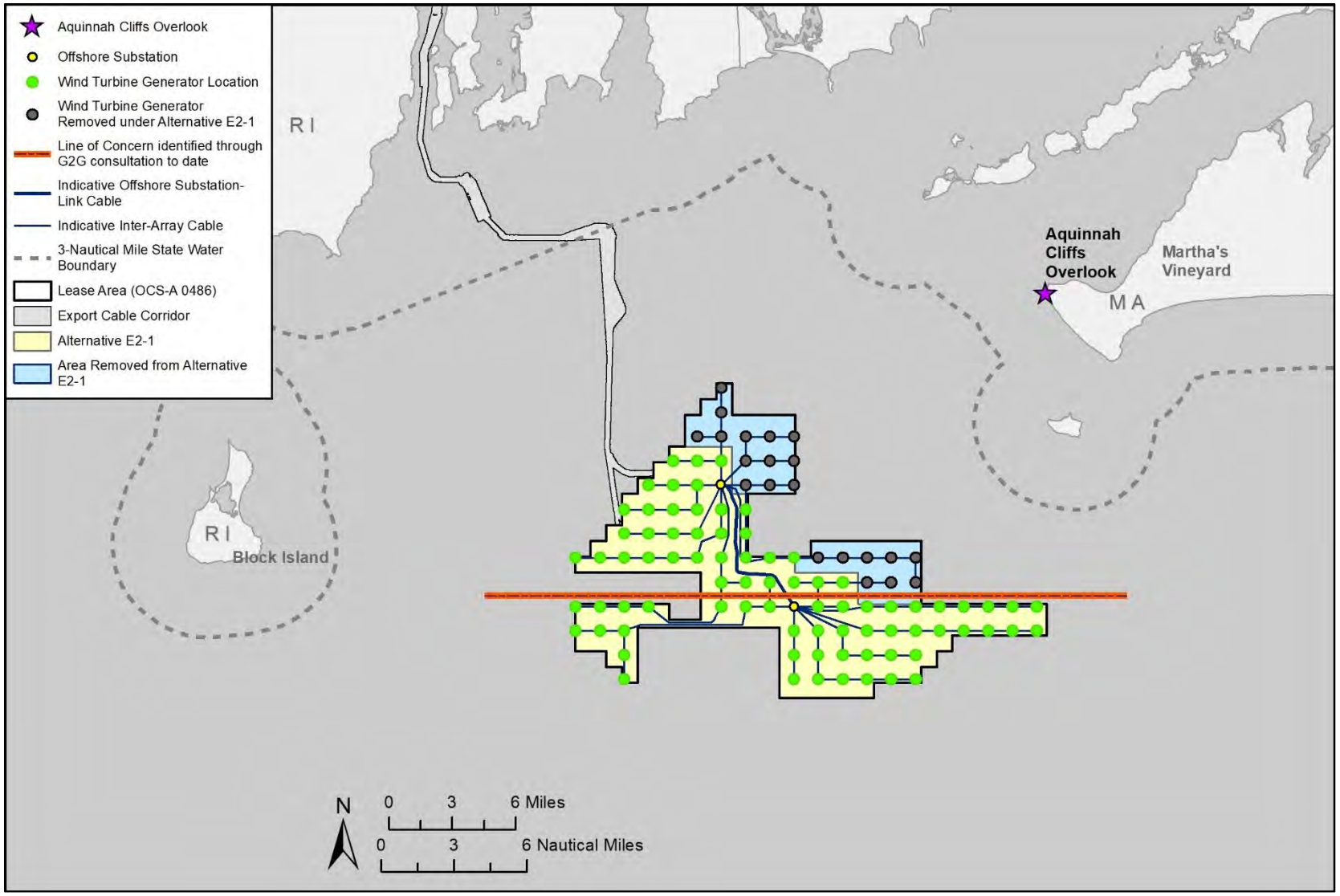

Figure K-9. Layout option 1 simulated for Alternative E2 (Alternative E2-1). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 880 MW maximum output; removal of 21 WTG positions (leaves 79 positions available).

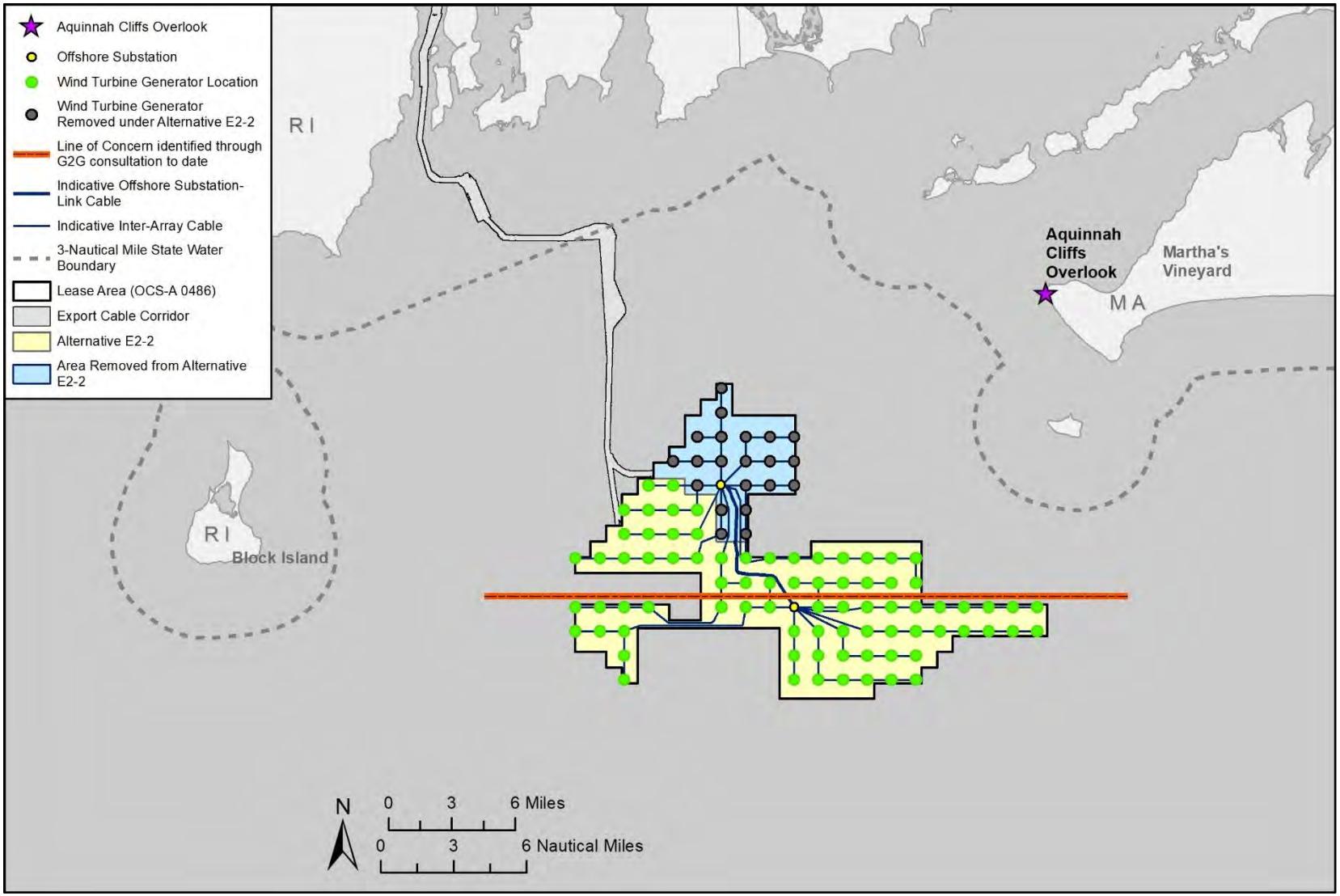

Figure K-10. Layout option 2 simulated for Alternative E2 (Alternative E2-2). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 880 MW maximum output; removal of 21 WTG positions (leaves 79 positions available).

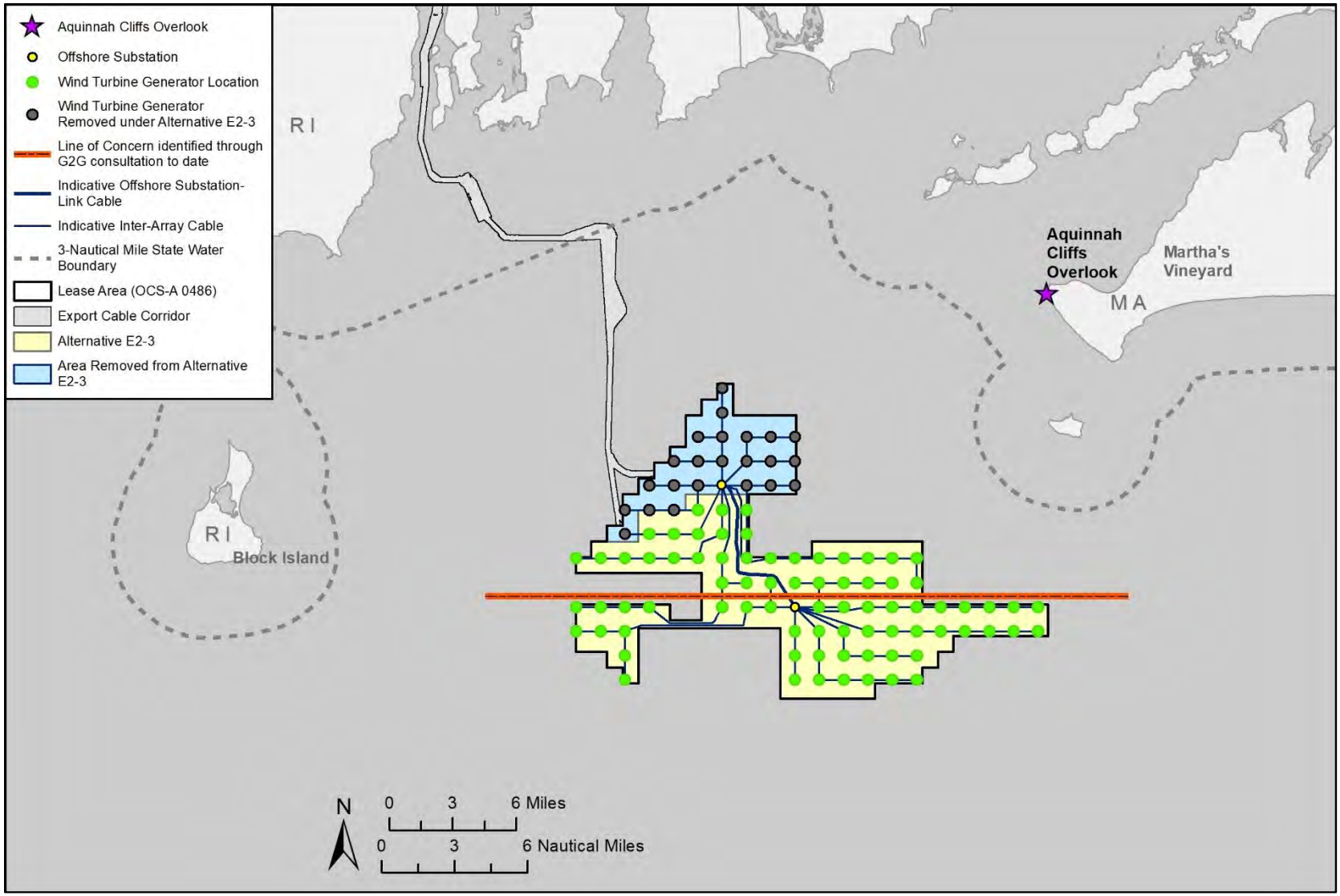

Figure K-11. Layout option 3 simulated for Alternative E2 (Alternative E2-3). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 880 MW maximum output; removal of 23 WTG positions (leaves 77 positions available).

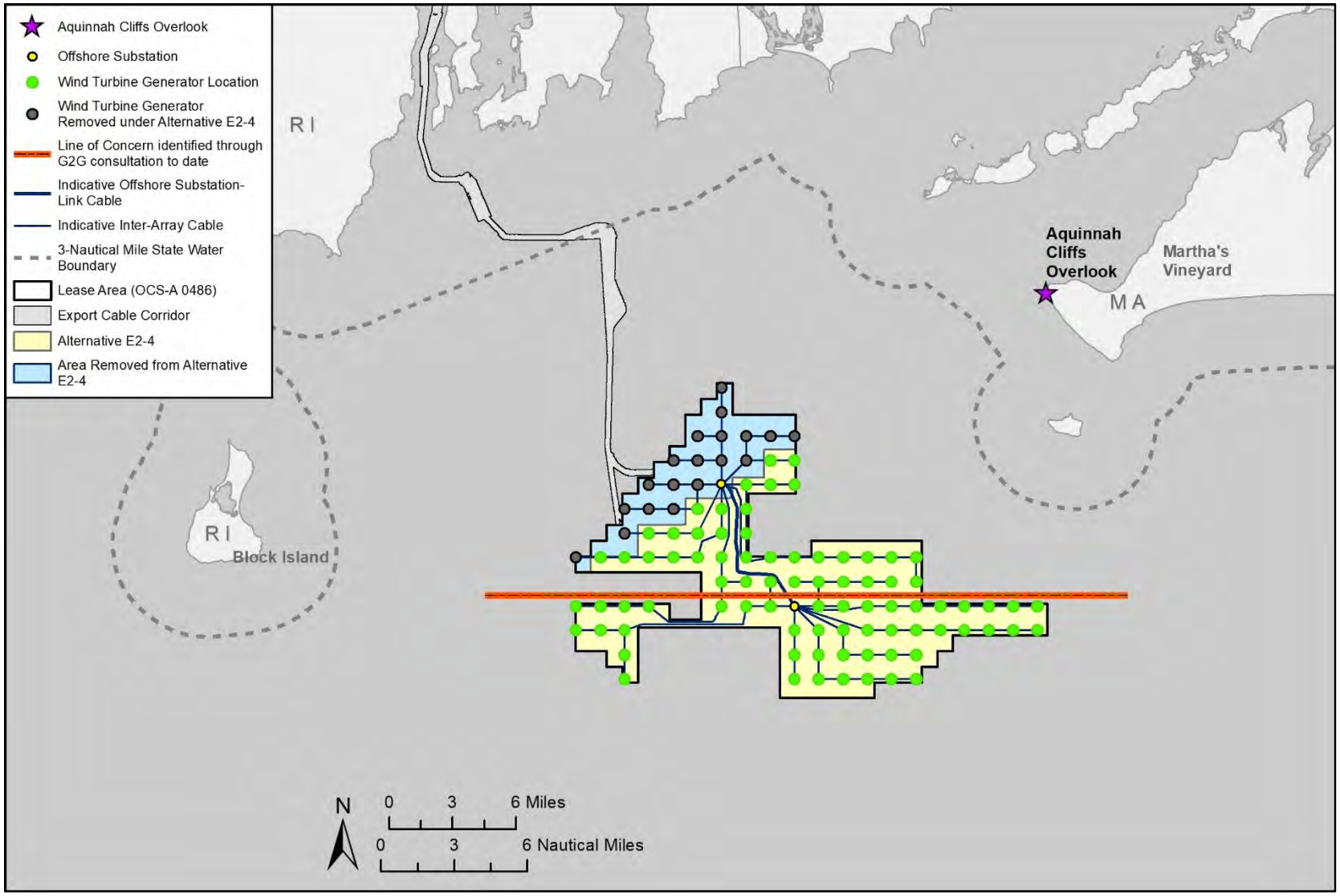

Figure K-12. Layout option 4 simulated for Alternative E2 (Alternative E2-4). Gray shaded WTG positions in the blue field are those that would be eliminated from consideration. 880 MW maximum output; removal of 23 WTG positions (leaves 77 positions available).

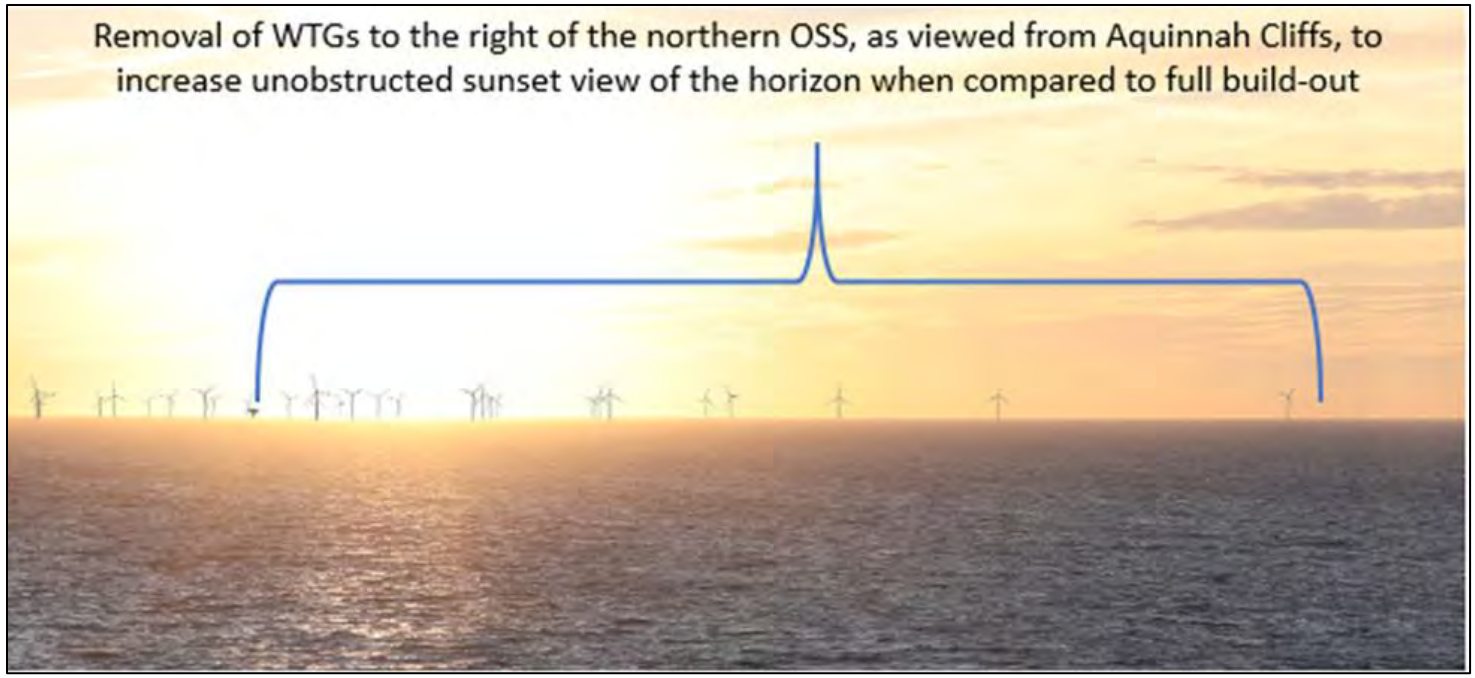

Figure K-13. Simulated sunset view facing the Project from Aquinnah Cliffs, indicating the WTG positions that would be removed under layout option E2-4.

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